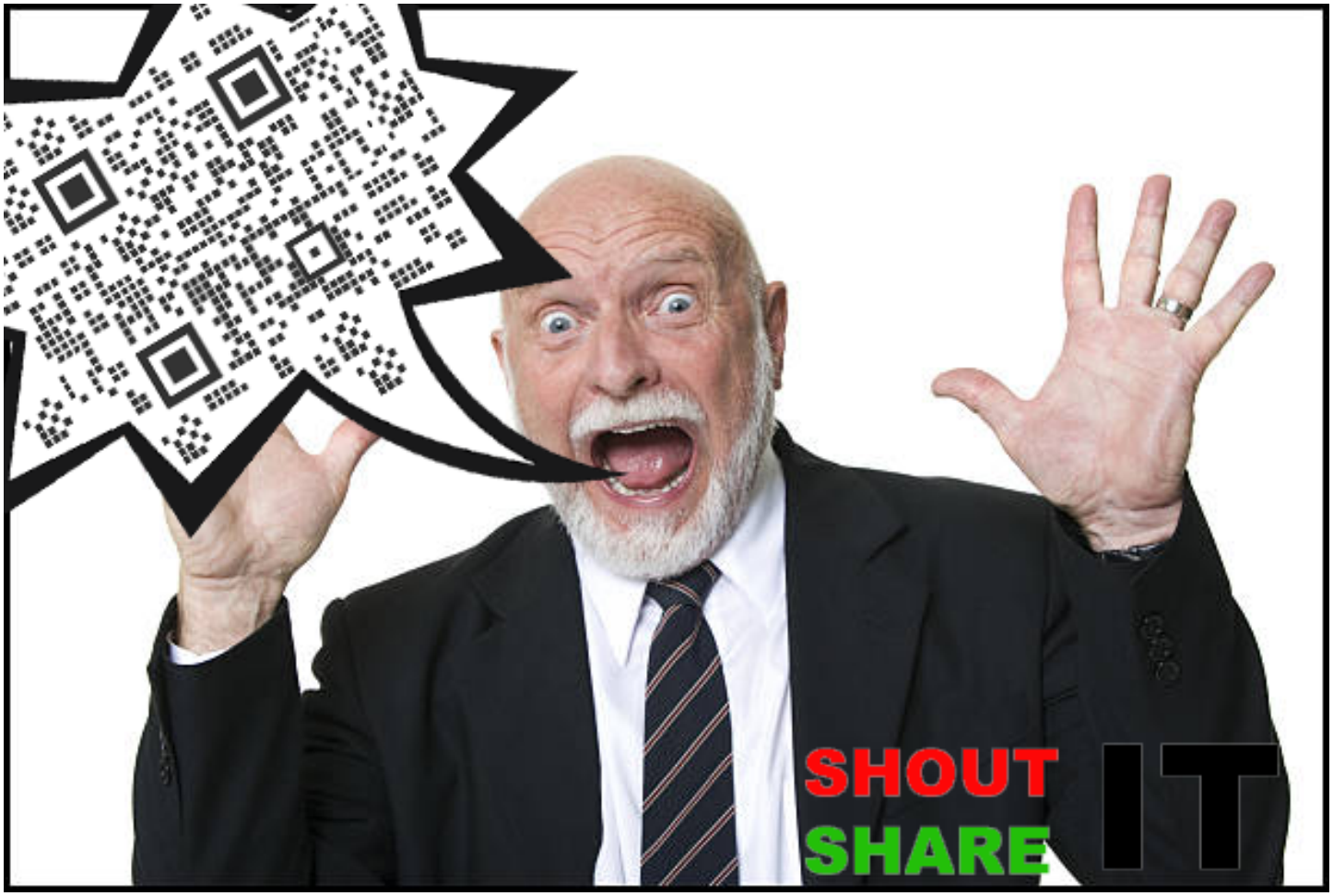
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The Great Basin Naturalist

VOLUME X, 1950

VASCO M. TANNER, *Editor*

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PACIFIC ISLANDS HERPETOLOGY NO. III
MOROTAI ISLAND [1]

VASCO M. TANNER
Professor of Zoology and Entomology
Brigham Young University

The Herpetology of Morotai Island has been neglected. Prior to World War II few collections were made on this island which has resulted in relatively few reptiles being reported from it. This, the third paper on the Pacific Islands Herpetology[2], is a report on a collection made on Morotai Island by Ernest Reimschiissel while he was stationed there as a member of the United States Armed Forces.

Moroati, the most northern island of the Moluccas or Spice Islands, is about 11 miles northeast of the northern end of Halmahera and is about 40 by 23 miles in extent. It is located approximately between 1°59′ north latitude and 128°30′ east longitude, and has a rather high elevation throughout the island. "The highest point of the island has an elevation of 4,101 feet and is one of the summits of the Sabatai Range, which stretches across the island in a northeast direction. On the river banks and on the flat southwestern part of the island are forests of sago trees and in the interior are dammar forests. It is frequented by people who collect dammar gum and also fish among the islands off the west coast. Along the coast are a number of villages. The northwest coast of the island between Tanjongs Wajaboela and Padangi, a distance of 24½ miles, is steep, and vessels can navigate rather close inshore, bearing in mind that a narrow coast reef exists in places. Along this coast are many mountain tops, but as they have no distinctive features, they are not of much use as landmarks. Anchor-

(1) Contribution No. 121. Dept. of Zoology and Entomology.
(2) *The Great Basin Naturalist*, Vol. IX, Nos. 1-2, pp. 1-20, Figs. 1-7, 1948; Nos. 3-4, pp. 25-41, 1949.

age can be found most anywhere along this coast, but depths are great. One may find anchorage in 11½ fathoms off the village of Tjio, ten miles northeast of Tanjong Wajaboela. Telok Sopi, the bay between Tanjongs Padangi and Sopi, offers good anchorage during favorable winds. Near the east coast a ridge of more or less conspicuous hills rises to heights of 900 to 1610 feet. Back of them are the higher Sabatai Mountains. Along the south coast between Tanjongs Posi Posi and Gila, a distance of twenty miles, the coast reef is steep. Sabatai Village, 8½ miles west of Sangowo, is located at the mouth of the river of the same name, which can be navigated by proas. The west coast of Morotai between Tanjongs Gila and Wajaboela, a distance of 18 miles, is fronted by numerous shoals, reefs, and islets, which lie up to five miles off shore. Tanjong Gila is a low, wooded tongue of land. Rao Island off the west coast of Morotai, has a mountain range along its eastern side. Its highest summit, with an elevation of 1,558 feet, is conical in appearance when seen from the southwestward. Rao Island is separated from Morotai by Rao Strait which is a little over a mile wide at its nearest part. Morotai Strait, the deep passage between the northern end of Halmahera and the islets and reefs of the west coast of Morotai, is 6½ miles wide, clear and easily navigated."(3)

The climate is characterized by an abundance of rain, winds which make for high seas, and rollers from the southeast and northeast, a rather uniform temperature of about 78° which does not vary more than a degree or two during the year, and a high humidity. Heavy showers from the south-southeast occur during the middle of the south monsoon. They come up about the middle of the forenoon without any warning.

The population is sparse, consisting in the main of natives who assist in the production of copra, nutmeg, cloves, sago, dammar gum, cajuput oil and valuable timber.

During World War II Morotai was one of the important airfield bases in a chain of fields from Australia to Manila. Mr. Reimschiissel was among some of the first of the United States armed forces to go onto this island in October, 1944. During his six months stay on the island he collected the reptiles which serve as a basis for this report. All the specimens were taken within a radius of three miles of the Pitu Airfield. (See accompanying map). Drs. Nelly de Rooij, 1915, and P. N. Van Kampen, 1923, report a total of eight species of amphibians and reptiles as occurring on Morotai. More recent reports by Stern-

(3) Sailing Directions for New Guinea and the Islands eastward of Celebes and Timor, 3rd Ed., 1936; U. S. Printing Office, Washington, D. C., pp. 85-89

feld, 1921; Parker, 1925; Kopstein, 1926; Mertens, 1930; and Brongersma, 1933, have added to this list. In this study I have reported thirty-one species as occurring on the island.

Twenty-three lizards are recorded, the majority of which are Scincids, thus Papuan and Australian in their affinities. Those with Malayan background are: *Hemidactylus frenatus; Calotes cristatellus*, and *Mabuya m. multifasciatus.*

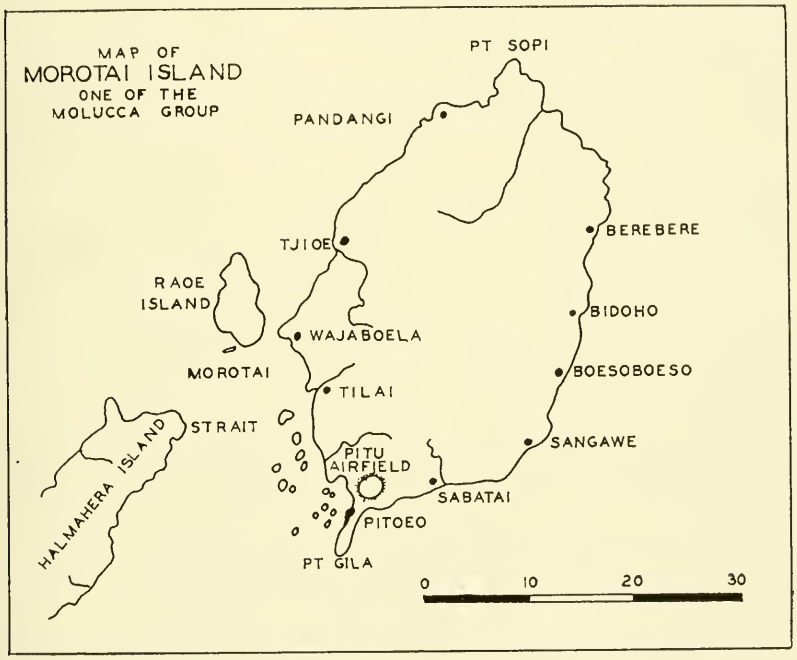


Fig. 1. Map of Morotai Island. Taken from Newsmap, Army Information Branch, September 25, 1944, Vol. III, No. 23F.

Six species of snakes are included in this list; two are endemic to the Spice Islands, and the other four are distributed southward. The two species of amphibians, *Hyla i. infrafrenata* and *Rana p. papua* range south of the once much-discussed Wallace line.

The Saurian fauna of Morotai is very similar to that of Halmahera, which is Papuan in the main. This is no doubt due to the close proximity of Morotai to Halmahera.

MR. REIMSCHIISSEL'S COLLECTING ACTIVITIES

Soon after Reimschiissel began collecting on Morotai Island I wrote to him inquiring as to his facilities and time available to

carry on a collecting program. Under date of December 27, 1944, I received the following letter. This I am reproducing here since it contains some valuable observations and information as to conditions under which the specimens in this report were collected:

"For the past month I have been very fortunate in that my work amounts to only afternoon shifts. The mornings have been free; here is the way I have spent some forenoons: Today I left at seven-fifteen for a trip. Dressed in a complete uniform for protection against mosquitoes, mites, etc. Over my shoulder I hung a bag with killing jars, empty containers — match boxes for the collecting of Molds for Dr. Martin. A weapon found some time previously, a sawed-off carbine which has been nicknamed "blunderbuss' I placed in the bag. It comes in very handy too. Along with these goes a hunting knife at my side and of course the net. The roads are muddy and wet because of the past rains, upon my arrival the country was very arid for a month. Now our shoes get heavy and pant legs wet, but that is something else.

At another unit I met a friend also interested in collecting. He has sent his collections to the Chicago Museum. A ravine was our destination. The sides are very steep with coral walls on either side, only here and there are breaks where one can go to the top, about 100 feet up. In the bottom is a muddy river — can't say river, for the water is stagnant, only runs when heavy rains fall. Grass and all sorts of vegetation is growing here, even on the coral rock up the sides. Fish are in the water, a few dragonflies sift the air. Birds are everywhere mainly parrots, owls and others that I cannot name. One in particular looks like a black hen, creeps on the ground or jumps from tree to tree seldom flying and not easily frightened.

We hadn't gone far before our pants were wet up to our knees with dew. All of a sudden I heard a loud noise. From my previous experience I thought it must be a lizard so after it I went. The large ones have a habit of making a noise when we are a few paces away, then stopping, and sometimes sneaking off if one is too close. Today it stood still and I could just make out its form against the green background. I pulled out the old blunderbuss which had no front sight, and shot. The reptile flinched; I with joy and excitement started to go toward it, but hesitated and shot again, fingers somewhat nervous. I knew definitely my aim was good for the object keeled over and lay still.

The animal was on the other side of the stream, now to cross it. It was too wide to jump so I had to start up the stream to find a place to cross. Shortly I came to a large limb which would bear my weight.

The other edge was filled with vegetation but I managed to get my object. To my surprise the second shot was the only one taking effect, right through both eyes (just a trifle below them). Picking it up, I started back with the prize to show it to my companion, my thoughts being that the morning was worthwhile though only eight o'clock.

We marched further up the stream, can't go too far for there is still a perimeter carefully watched. A tree along the way which had been scarred contained a number of long brown weevil (with yellow stripe, lengthwise) also many small bees were after sap. At the base was a very pretty flowering plant, which I picked up for a sketch. On we went, on the alert at all times for anything alive.

Small lizards scamper off here and there. I don't bother with these for I think enough have already been collected. But a funny looking one appears on the edge of the stream. Upon approach it skips across the water, getting close, dives under. It has a large tail, appears as tho it has but two legs — don't know yet. It bothered me, for it's the third of its kind that has escaped.

The ravine takes a sharp curve. A number of trees have been felled and some pushed in from the top where construction work goes on. On one tree in particular are many long-horned beetles, black with white stripe along their backs, also a few weevils and a green tree boring beetle. We stopped and collected as many as possible.

The water had disappeared, only here and there are a few holes that are still filled. I found a small frog, previously they had eluded me. Many large well-decayed logs are across the main stream bed, here the orange-black tiger beetles abound. The small very light brown tailed lizard is everywhere, species no. 21. It is so fast and agile that one can't catch it. Many twigs, roots and plants get in one's way. I was fortunate to get one good specimen from another area. Under the logs are molds and others of the fungi family, today in particular I gathered many not previously seen. Fortune seems with me. My mind doesn't think of the work at hand, just that of collecting and sending the material.

I climbed to the top of the ravine, for a bulldozer was at hand and I'm still looking for worm snakes, with no success for it has finished this work, but a small puddle of water 20′ wide had dragon flies around it, so I stopped here and caught some.

My companion and I got separated so I went down into the ravine and found him still catching beetles from the large dead tree. I suggested that we go back for it was now ten-thirty, but he stayed a while longer for his luck was good. Returning I glanced at a spray of orchid

flowers. I'll get them another day for they are in bloom. Fellows spotting the lizard ask what it was. I myself don't know. It is just a large reptile to me, probably an iguana. Even the C. O. and others of our unit looked at my specimen. (This is a specimen of *Lophura weberi* Barbour, BYU 7745. — Writer's note.)

Now comes the job of getting a container large enough. It usually has been that when I have containers, no formalin is at hand, when both, no specimens. I've even gone thru many a garbage can, picked up a small bottle, even ink bottles. I was stumped. I walked into the E. M. mess hall, checked and found nothing there, not even a can with a decent lid. I checked the officers, nothing. I saw the paint shop and an idea struck — why not use a gallon paint can. Sure enough, again visiting the nearby dump, I emerge with a can and lid.

It took another half hour or so to clean it up, and I am still wondering if it's big enough. Yes, it will do. Fortunately a pint of formalin is at hand so preparations are in order.

That is one day's work — that is after I've done four hours of my regular duty. I've spent anywhere from twelve to twenty hours out in the field during the week. This does not count the rest of the time spent in sketching or writing up notes on other days or evenings.

I'm a person who likes to keep busy and I find great enjoyment in getting out, away from seeing men all the time. One can get much repose just from nature. I'm also hoping that some of my efforts will prove useful to the University and the development of science — tho they are meager."

LIST OF AMPHIBIANS AND REPTILES CONSIDERED IN THIS PAPER

AMPHIBIANS

Family Hylidae

HYLA INFRAFRENATA INFRAFRENATA GUNTHER

Gunther, Ann. Mag. Nat. Hist., (3) XX, 1867, p. 56.

BYU 7490, 7608, 7641	Morotai (E. Reimschiissel)	December, 1944
BYU 7730, 7871	Morotai (E. Reimschiissel)	January, 1945

Head as long as broad; nostril nearer the tip of the snout than the eye, tympanum oblong, 6 mm. long; mouth large, 30 mm. wide; tongue free behind, small notch in front; vomerine teeth large and in two series on the posterior borders of the choanae; eyes prominent, 9.5 mm. in diameter; disks of the fingers larger than those of the toes;

third finger with a disk 7 mm. in diameter, fingers webbed about one half; toes almost entirely webbed. Body length 96 mm.; leg length 166 mm. Specimen BYU 7608 ♂ dorsal color bluish violet (grass-green in life); a white line along border of lower lip; white line on inner margin of tibia; ventral color whitish, belly and legs coarsely granulate. The male has a well-developed vocal sac inside which is the sharp pointed ossified omosternum.

Reimschiissel reports this species as "barking like a dog, having a golden-colored eyes, long hind legs, and being a bright green color." He collected about 20 tadpoles and some eggs of this species.

Family Ranidae

RANA PAPUA PAPUA LESSON

Lesson, Voyage Coquille, Zool., II, 1, 1830, p. 59, pl. III, fig. 1.

BYU 7606, 7739 Morotai (E. Reimschiissel) January, 1945
BYU 7768, 7891 Morotai (E. Reimschiissel) February, 1945

Head longer than broad (25 mm. by 21 mm.); snout pointed and projecting; canthus rostralis forming an angle; loreal area concave and vertical; nostril nearer the tip of snout than to the eye; tympanum large, 6 mm. in diameter, and in a concavity which extends backward from the eye; first and third fingers longest, disks of fingers smaller than those on the toes; third and fifth toes equal in length; toes entirely webbed. Specimen BYU 7606 a ♀ filled with eggs, has a body length of 68 mm., and a hind leg length of 127 mm.; smooth above, with a dorsolateral fold and a glandular fold from below the tympanum back to above the foreleg.

Reimschiissel reports these frogs in life as being slightly golden brown above, with a black streak extending back over the eye and tympanum to above the front leg; hind legs with four dark cross bars, legs darker brown than the back; ventral surface with brown mottling on the throat and under parts of the hind legs, on a whitish background.

LIZARDS

Family Gekkonidae

GYMNODACTYLUS PELAGICUS (GIRARD)

Girard, Proc. Ac. Philad. 1857, p. 197. (Heteronata)

BYU 7331, 7540 Morotai (E. Reimschiissel) October 4, 1944

Rostral twice as broad as high; nortril bordered by the rostral, supranasal, two granules and the first upper labial; seven upper and

seven lower labials; mental large V-shaped, with a pair of small chin-shields next to the mental, posteriorly. Back with 17 longitudinal series of round, conical, ribbed tubercles, ventral scales small and keeled. The adult specimen (BYU 7540) has an angular series of 7 praeanal pores.

Color brown above with blackish transverse bands; ventral dark brown; labial sutures whitish.

Found, according to Reimschiissel, in dark places during the day, under logs and coconut bark.

HEMIDACTYLUS FRENATUS DUM. AND BIBR.

Dumeril and Bibron, Ext. Gen. 3, 1836, p. 366.

BYU 7368-7371, 7385	Morotai	(E. Reimschiissel)	October, 1944
BYU 7397, 7426-7430	Morotai	(E. Reimschiissel)	October, 1944
BYU 7432, 7526, 7541	Morotai	(E. Reimschiissel)	December, 1944
BYU 7643, 7670, 7674	Morotai	(E. Reimschiissel)	December, 1944
BYU 7740, 7823,	Morotai	(E. Reimschiissel)	January, 1945

Rostral one time and one half as broad as high; nostril bordered by the rostral, and three nasals; in none of the above specimens is the first labial in contact with the nostril; ten to eleven upper and eight to ten lower labials; well developed teeth on both lower and upper jaws; two pair of chin-shields, the first pair in contact behind the mental; back with small granular scales and two to eight longitudinal rows of conical tubercles; ventral scales large and imbricate; tail slightly flattened with dorsal and lateral rows of enlarged flattish conical scales; under surface with a row of enlarged imbricate scales; digits dilated, free, claw dorsal; 7 to 8 lamellae on the fourth finger and 9 to 10 lamellae on the fourth toe; twenty-eight to thirty-two praeanal pores.

Color light brown above with some darker blotches along the back and sides; venter lighter, but without markings.

This species was common throughout the area of occupation on Morotai. It is a widely distributed species through the South Pacific Islands.

GEHYRA OCEANICA (LESSON)

Lesson, Voyage Coquille, Zool. II, I, 1830, p. 42, pl. II, fig. 3.

BYU 7317-18 Morotai (E. Reimschiissel) November, 1944

Rostral not twice as broad as high; nostril surrounded by the rostral, supralabial and four supranasals. There are thirteen upper labials and twelve to thirteen lower labials; digits only slightly webbed at the base; thirteen lamellae on the fourth finger and fourteen lamellae on the fourth toe.

Body more slender not as robust as *G. marginata*. Light brown in color with same blotching on the dorsal portions of the legs; venter practically white.

GEHYRA MARGINATA BOULENGER

Boulenger, Cat. Liz. III 1887, p. 486.

BYU 7441 Morotai (E. Reimschiissel) November, 1944
BYU 7870 Morotai (E. Reimschiissel) February, 1945

Rostral twice as broad as high, the center supranasal entering the emargination of the rostral; nostril bordered by the rostral, first supralabial, and four supranasals, the first one the largest; fifteen upper and lower labials; mental about twice as wide as the first lower labial, in contact with the latter and a pair of chin-shields; twenty-four lamellae on the fourth toe and also the fourth finger; the digits, partly webbed.

Dark brown in color with no noticeable markings, very tender skin, readily broken, thus damaging the specimens. Body length 109 mm., tail length 94 mm. Body width just back of front legs 25mm. Specimen BYU 7870 was collected on the trunk of a sago palm, February 9, 1945.

LEPIDODACTYLUS LUGUBRIS (DUM. AND BIBR.)

Dumeril and Bibron, Erp. Gen. III, 1836, p. 304.

BYU 7394, 7431 Morotai (E. Reimschiissel) November, 1944
BYU 7668, 7671 Morotai (E. Reimschiissel) January, 1945
BYU 7673, 7675 Morotai (E. Reimschiissel) February, 1945
BYU 7676-7679 Morotai (E. Reimschiissel) February, 1945

Head long and narrow; ear-opening nearer the eye than the nostril; rostral broader than high; nostril surrounded by the rostral, first upper labial, and two supranasals; eleven to thirteen upper and lower labials; mental smaller than the contiguous lower labials; four to five rows of small chin-shields; twenty-seven to twenty-nine femoral pores on males; digits only slightly webbed; 13 to 15 lamellae on fourth toe and 12 to 14 lamellae on the fourth finger. Body length 40 mm., tail, 34 mm. Color light grey or brown with irregular small blackish pigmented areas; venter white to pinkish.

Mr. Reimschiissel reports that this is a common species on the Island, and that it lays eggs on the grass near the camp.

GEKKO VITTATUS HOUTTUYN

Houttuyn, Verh. Genootsch. Velissingen IX, 1782, p. 325.

BYU 7344, 7345 Morotai (E. Reimschiissel) October, 1944
BYU 7376-7378 Morotai (E. Reimschiissel) November, 1944
BYU 7386, 7390 Morotai (E. Reimschiissel) November, 1944

BYU 7391, 7440	Morotai	(E. Reimschiissel)	December, 1944
BYU 7485-7486	Morotai	(E. Reimschiissel)	January, 1945
BYU 7607, 7609	Morotai	(E. Reimschiissel)	January, 1945
BYU 7642, 7716	Morotai	(E. Reimschiissel)	January, 1945
BYU 7717-7722	Morotai	(E. Reimschiissel)	January, 1945
BYU 7765-7767	Morotai	(E. Reimschiissel)	January, 1945
BYU 7769, 7771	Morotai	(E. Reimschiissel)	February, 1945
BYU 7795-7815	Morotai	(E. Reimschiissel)	February, 1945
BYU 7872-7874	Morotai	(E. Reimschiissel)	February, 1945
BYU 7876, 7878-79	Morotai	(E. Reimschiissel)	February, 1945

Head average 24 mm. long from the large round ear opening to rostral tip; 17 mm. wide just in front of ear; rostral wider than high; nostril bordered by rostral, first upper labial and three supranasals; fourteen to sixteen upper labials; thirteen to sixteen lower labials; mental about the size of the second lower labial and in contact with the small chin-shields. Males with 47 to 56 praeanal pores. Digits with rudimentary webbing, fourth toe with 20 to 25 undivided lamellae; finger with 20 to 22 lamellae.

Preserved specimens greyish-brown above, with a white dorsal line which forks in the nuchal area and extends to each eye. Tail with four to seven white bands. In young specimens the white markings on the back of the tail are very noticeable.

Mr. Reimschiissel made a drawing of many of the lizards of this area and recorded his observations on the live specimens. Concerning this species he wrote the following:

"Specimens are found on palm trees, sago, nipa, coconut, also on building walls and ceilings. It is seven to eight inches long, large head, wide mouth; eyes, grey-brown, retina black, broken pupil, with eyelids brown veined. Skin, soft leathery brown, with small orange brown warts on back, scales tan brown on abdomen and under side of legs. An orange yellow line runs from the hind legs to head, dividing at head, forks running to the eyes. Tail colored, in seven concentric segments, white and brown; new tail in greenish brown and smooth, curls. Lays eggs; young with white line."

Family Agamidae

CALOTES CRISTATELLUS MOLUCCANUS PETERS

Peters, Mon. Berl. Akad., 1867, p. 171.

BYU 7375, 7387	Morotai	(E. Reimschiissel)	November, 1944
BYU 7438, 7603-5	Morotai	(E. Reimschiissel)	December, 1944
BYU 7712-7715	Morotai	(E. Reimschiissel)	January, 1945
BYU 7776-7781	Morotai	(E. Reimschiissel)	February, 1945

A series of 16 well-preserved specimens, the largest ones have a total length of 369 (84 + 285) mm. The scales of the head are small

and all the scales of the body are strongly keeled. The nuchal crest scales 14 to 19; supraocular scales enlarged with an enlarged posterior patch of three or four scales, nine upper and lower labials.

Reimschiissel reports the eye with a black pupil, golden brown retina with golden rim near pupil. Body color green dorsal, yellow to yellow-green venter; tip of mouth white. (Preserved specimens bluish-green); long slender tail, hind legs and toes long. Found on vegetation and in trees up to 125 feet in height, near the coral ledges. Egg long and pointed at each end; like a frog in that they jump and have a large fleshy tongue.

The Morotai population may be considered as a race of *cristatellus*. However, I am unable to distinguish them from specimens from other areas with which I have compared them.

LOPHURA WEBERI (BARBOUR)

Barbour, Proc. Biol. Soc. Wash. XXIV 1911, p. 20.

BYU 7745 Morotai (E. Reimschiissel) December 13, 1944

Snout with enlarged keeled scales, between the nostrils; distance of the round nostril from the anterior border of the eye three times the diameter of the tympanum; ten upper and ten lower labials; a row of 8 large scales on one side and seven on the other run parallel with the labials from the large triangular mental to a point below the middle of the eye; nuchal and dorsal crests interrupted; along each side of the body are seven groups of larger round keeled scales, six rows of large strongly keeled scales on the upper surface of the forelimbs; pores sixteen on one side and fourteen on the other. Length of specimen when killed 37 inches.

Mr. Reimschiissel shot this specimen through the eyes at about forty paces with his "blunderbuss." After preserving it with formalin he shipped it to me in a gallon paint can. It arrived in excellent condition. Before being preserved it was green under the throat and abdomen and extending upon the side of the body. Digestive tract was filled with plant leaves.

By using Barbour's original description of *weberi* and his drawings, 1912, pl. 4, I am convinced that the specimen before me should be referred to this species. It is a new record for Morotai.

Family VARANIDAE

VARANUS INDICUS (DAUDIN)

Daudin, Rept. III 1802, p. 46, pl. XXX.

BYU 7477 Morotai (E. Reimschiissel) December 19, 1944

A well-preserved specimen of this species was collected on December 19, 1944, by Mr. Reimschiissel. The following are his notes on this specimen: "Thirty-two and one-half inches long; found on a log at edge of stream in a ravine. Scales are small, in rings around the body, most of them are black, but here and there are blotches of yellow green ones. Pupil black, brown retina. Long slender toes, tail long and flattened. Contained a crab in an enlarged part of the intestine, also egg sacks on each side of the body with round eggs of various sizes. Liver large, tongue long and forked.

This species is widely distributed southward in New Guinea, Admiralty Islands and the Solomons. Reimschiissel collected other specimens of this species but was unable to preserve and ship them.

Family Scincidae

TILIQUA SCINCOIDES GIGAS (SCHNEIDER)

Schneider, Hist. Amph. II 1801, p. *22*.

BYU 7396 Morotai (E. Reimschiissel) October 4, 1944

Rostral one time and one-half as broad as high, in contact with the nasal, frontonasal and first upper labial; nostril in the nasal, no supranasals; frontonasal in narrow contact with the rostral; praefrontals in contact; frontal longer than broad, (13 mm.) longer than parietals (10 mm.) and in contact with the anterior two supraoculars; supraoculars 4; supraciliaries 4; forearm 48 mm.; head length 45 mm., axilla to groin 124 mm.; 3 anterior temporals; eyelids scaly, eye opening about as large as the ear opening, which is shielded by the large anterior lobules. Seven upper and eight to ten lower labials; mental twice as broad as high in contact with the first lower labial and the first large transverse chin-shield, which is in contact with two lower labials on one side, and three on the other. Dorsal scales slightly keeled, in 31 rows around the middle of the body. Fingers and toes short, with claws. Adult length 353 (190+163) mm. Scales on tail similar to those on the body. Seven dark bands around the body and twelve bands around the tail.

The general facies of this species, the measurements, scalation and color lead me to question the soundness of considering *gigas* as a subspecies of *scincoides*. (Loveridge, 1948, p. 339, and Mitchell, 1950, p. 295). I am inclined to believe that a larger series of specimens from the northern Moluccas may justify this conclusion.

Reimschiissel reports that this species makes a hissing noise like a goose.

MABUYA MULTIFASCIATA MULTIFASCIATA (KUHL)

Kuhl. Beitr. Zool. Und Vergl. Anat. 1820, p. 126. (Scincus)

BYU 7379, 7437	Morotai	(E. Reimschiissel)	October, 1944
BYU 7442, 7487	Morotai	(E. Reimschiissel)	November, 1944
BYU 7488, 7489	Morotai	(E. Reimschiissel)	December, 1944
BYU 7593, 7663	Morotai	(E. Reimschiissel)	January, 1945
BYU 7664, 7672	Morotai	(E. Reimschiissel)	January, 1945
BYU 7786, 7818	Morotai	(E. Reimschiissel)	February, 1945

Rostral in contact with the fisrt upper labials, nasal, supranasals and frontonasal; frontal as long as the frontoparietals and interparietal together; four supraoculars, second larger; a pair of keeled nuchals, six upper labials, the fifth the largest and below the eye; seven lower labials, the first two in contract with the large transverse chin-shield; ear large and round, farther removed from the eye than the nostril; 30–33 scale rows around the middle of the body, dorsal scales with 3-5 keels, ventral ones smooth. fourth toe with 15-17 undivided scales, fourth finger 12–13 scales. Color uniform brownish above, pinkish white on venter. Length of specimens 290 mm. to 360 mm.

Common in the area where Reimschiissel collected; a widely distributed species.

DASIA SMARAGDINUM MOLUCCARUM BARBOUR

Barbour, Proc. Biol. Soc. Wash. 24, 1911, p. 17.

BYU 7356, 7357	Morotai	(E. Reimschiissel)	October, 1944
BYU 7372, 7373	Morotai	(E. Reimschiissel)	November, 1944
BYU 7374, 7434	Morotai	(E. Reimschiissel)	December, 1944
BYU 7631, 7640	Morotai	(E. Reimschiissel)	January, 1945
BYU 7645-7649	Morotai	(E. Reimschiissel)	January, 1945
BYU 7661	Morotai	(E. Reimschiissel)	January, 1945

Rostral not twice as broad as high, in contact with the first labial, nasal and frontonasal; nostril in the nasal; no supranasals; two praefrontals; frontal as long as the frontoparietal and parietal together; four supraoculars; one to three pairs of nuchals and a pair of larger temporals; five to six upper labials before the subocular; seven to eight lower labials. Ear small and slightly oblong with one or two guard scales; ear farther removed from the eye than the nostril is; lower eyelid scaly. Mental about as broad as the rostral; first large chin-shield in contact with the mental and first two or three lower labials. Twenty to twenty-four scale rows around the middle of the body; dorsal scales faintly keeled, ventral scales smooth. Fourth toe with 28-33 lamellae. Heel with a large oval scale. Greyish-brown above, some specimens with a greenish-blue on the shoulders and neck region, with four to five dorsal rows of black spots, and on some specimens

these spots are preceded by light bluish ones. Ventral parts yellowish to white. Body length 53-84 mm.; tail length 70-116 mm.

In making a study of this and other species of this paper, I have obtained much help from Prof. Loveridge's recent excellent paper, 1948, on "New Guinean Reptiles and Amphibians in the Museum of Comparative Zoology and United States National Museum." In my previous paper, 1949, in which I dealt with specimens of Dasia from Cebu and Leyte Islands I considered them as *s. smaragdinum* (Lesson). Loveridge's study suggests that the species of this genus should be placed as follows: the grey spotted specimens from the Philippine Islands and Morotai may be known as *D. s. philippinicum* and *D. s. moluccarum,* respectively; while the greenish (blue in preservative) specimens from the Admiralty Islands may be considered as *D. s. percirides.* This is only a tentative arrangement since this complex is in need of more study as pointed out by Loveridge.

RIOPA MENTOVARIUM (BOETTGER)

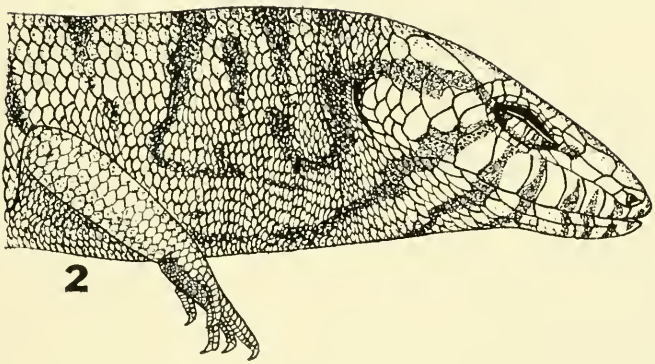
Boettger, Zool. Anz. XVIII 1859, p. 119, Figs. I & II.

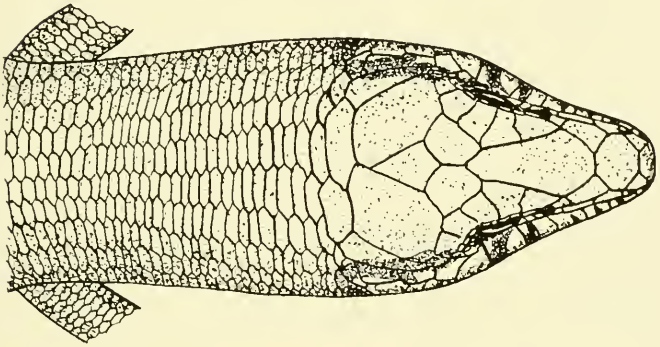
BYU 7433, 7439 Morotai (E. Reimschiissel) October, 1944
BYU 7539, 7785 Morotai (E. Reimschiissel) December, 1944

Rostral not twice as broad as high, (5–3 mm.); nostril between the nasal and the supranasal; frontonasal broader than long, contact narrow with the rostral and broader with the frontal; praefrontals small and widely separated; frontal about as long as the frontoparietal and parietal together; frontal in contact with two anterior supraoculars, 8 supraciliaries; lower eyelid scaly; parietals large and in contact behind; ear opening small, with five guard scales; upper labials eight, sixth largest and below the eye, but separated by a row of small scales; lower labials six to seven; mental large, first chin-shield in contact with the first two lower labials. Body scales smooth, 32 to 36 around the middle of the body, 24 lamellae on the fourth toe. Total length 275 mm. (130 + 145).

Brown above with seven to nine transverse crossbands and longitudinal dark lines due to the coloration of the scales. Six dark bands, which have their origin in the upper and lower labials, extend at an angle on to the throat region; five to seven dark bands back of the ear.

The figures 2 and 3 are dorsal and lateral drawings of specimen BYU 7785. These set forth the scalation and color pattern of this species. Reimschiissel described the color of live specimens as "light greenish brown above with dark stripes around the thorax and stripes diagonally from the mouth to the neck; other parts of abdomen nearly white."





Figs. 2 and 3. *Riopa mentovarium* (Boettger).
Side and dorsal view of head. 2x.

LYGOSOMA GRAY

(Gray, Zool. Jour. III, p. 228, 1827)

This genus is widely distributed in the tropical and semi-tropical countries and is especially rich in species in the South Pacific Islands.

For convenience the genus is divided into sections. The following sections are represented in the Morotai species before me:

I. Lower eyelid scaly.

A. Limbs well developed.

1. No supranasals; tympanum distinct; praeanals enlarged—(Hinulia) ..... Sphenomorphus

B. Limbs short, or rudimentary, or absent.

I. Limbs short; no supranasals; ear opening distinct; praefrontals small and separated; frontal broader than supraocular region ..... Lygosoma

II. Lower eyelid with a transparent disk; Limbs well developed.

A. No supranasals; tympanum distinct; enlarged nuchals present ..... Leiolopisma

Section Sphenomorphus

LYGOSOMA (SPHENOMORPHUS) VARIEGATUM JOBIENSE MEYER

Meyer, Mon. Berl. Ac. 1874, p. 131.

BYU 7313 Morotai (E. Reimschiissel) October, 1944

Lower eyelid scaly; nostril in the nasal; no supranasals; rostral long and rounded behind; praefrontals forming a suture; frontal as long as frontoparietals and interparietal together, in contact with the anterior three of the seven supraoculars; ten to eleven upper and eight lower labials; ear opening oblong and large, without guard scales; mental and first chin-shield large. Body scales smooth, forty-two around the middle of the body; fourth toe with twenty-seven lamellae. Body length 103 (41 + 62) mm. Glossy brown above, with large black blotches behind the ear and extending behind the shoulder, under surface whitish.

Loveridge, 1948, p. 343, has a key to the subspecies of *variegatum* found in New Guinea.

LYGOSOMA (SPHENOMORPHUS) CONSOBRINUM CONSOBRINUM PETERS AND DORIA

Peters and Doria, Ann. Mus. Civ. Genova, XIII, 1878, p. 342.

BYU 7598-7600, 7735 Morotai (E. Reimschiissel) January, 1945
BYU 7742, 7789, 8896 Morotai (E. Reimschiissel) February, 1945

Rostral about twice as broad as high; contact with frontonasal narrow; nostril in nasal; single anterior loreal; no suparnasals; praefrontals in contact; frontal long and pointed, in contact with anterior two supraoculars; 6 supraciliaries, 4 supraoculars; 7 upper and 7 lower labials. Ear opening round, no lobules; eyelid scaly; first chin-shield in contact with the mental and first and second lower labials. 32 rows of scales at middle of body; 20 lamellae on the fourth toe. Total length BYU 8896, 91 (34 + 57) mm.

Light brown on the dorsal 4 to 5 rows, bordered with 3 to 4 rows of black scales; ventral body and tail with pinkish areas on some specimens.

LYGOSOMA (SPHENOMORPHUS) MINUTUM MEYER

Meyer, Monatsb. Akad. Wiss. Berlin, 1874, p. 132.

BYU 7733, 7736 Morotai (E. Reimschiissel) January, 1945

Head pointed, ears large and round; rostral about twice as broad as high, a broad straight suture with the frontonasal; nostril in the nasal; a single small anterior loreal, no supranasal; praefrontals in contact with the frontonasal, loreals, supraciliaries, supraocular, frontal and are widely separated; supraoculars 4; supraciliaries 7; 6 upper and 5 lower labials, mental broader than wide, the first single chinshield in contact at about the middle of the first lower labial which is as long as the two anterior upper labials. Nuchal poorly developed, only on one side; scale rows around middle of body 23; lamellae under fourth toe 17. Body length 73 (34 + 39) mm.; legs long, extended hind legs meeting front legs. Tail compressed on posterior two-thirds. Color brown with small mottling on dorsal, throat and caudal scales. Belly white. The Morotai specimens have more body scales and toe lamellae than the New Guinea ones as reported by Loveridge.

Reimschiissel reports that these two specimens were taken along with a worm snake by Lt. Hobbs. They apparently are found in the humus and litter of the top soil. This is an interesting new record for Morotai. It does not agree in every respect with descriptions of New Guinea specimens, but without more material I am referring it to Meyer's *minutum*.

Section Lygosoma

LYGOSOMA (LYGOSOMA) SOLOMONIS BREVIPES BOETTGER

Boettger, Zool. Anz. XVIII, 1895, p. 121.

BYU 7346-7348, 7381, 7395	Morotai	(E. Reimschiissel)	November, 1944
BYU 7398-7399, 7401, 7404	Morotai	(E. Reimschiissel)	December, 1944
BYU 7435, 7528-7538, 7588	Morotai	(E. Reimschiissel)	January, 1945
BYU 7591, 7594	Morotai	(E. Reimschiissel)	February, 1945

Lower eyelid scaly; ear opening round, smaller than the eye opening, no lobules; nostril in the nasal; no supranasals; rostral broader than high, extending between the nasals and narrowly contacting the frontal; praefrontals small and separated; frontal broader than the supraocular region, shorter than the frontoparietals and interparietal together, in contact with the first supraciliary and the two anterior supraoculars; parietals in contact; three to six pairs of nuchals. Supraoculars 4 to 5; supraciliaries 4 to 5, fifth upper labial large and below the eye, in many of the specimens the fifth labial is not separated from the eye by a scale, but the small scales are wedged in on the sides;

5 lower labials; mental broader than high; large chin-scale in contact with first, in some specimens the second lower labial; 26 (1), 27 (1), 28 (8), 29 (2) rows of scales around the body. Body long and thin, from snout to foreleg into distance between axilla and groin 1½ times. Lamellae on the fourth finger 7 to 9, fourth toe 15 to 18; front arms and fingers small; hind legs larger, tail large, in some specimens the proximal portion has about the same diameter as the body. Body length 34 (1), 41 (1), 47 (1), 51 (1), 52 (2), 53 (2), 54 (3), 55 (1), mm.; tail length 26 (1), 43 (2), 54 (2), 57 (2), 64 (1), 72 (2), 76 (2) mm.

Color of live specimens as reported by Reimschiissel: back grey-black, mottled; throat white, abdomen white with orange, under surface tail white, upper surface light brown, scales slick and reflect light. Preserved specimens brown with black flecks of pigment along the sides and back of head, body and tail; throat and portions of the under-surface of the tail dotted with dark spots; other ventral surface light to pinkish.

Reimschiissel observed that this species was hiding during the day in trash and old sacks around the camp. It was not very active when disturbed.

I have three specimens BYU 7875, 7877, 7893, collected in January, 1945, at Hollandia, New Guinea by Mr. Reimschiissel. These were studied by Dr. Walter C. Brown along with the Morotai specimens. He is inclined to follow Loverdge, thus considering the Hollandia specimens as *L. a. schodei* Vogt. After a study of the Morotai series along with the Hollandia specimens and a large number of *Lygosoma (Lygosoma) solominis* Boulenger from Gaudalcanal, I am unable to separate *schodei* from *brevipes*. In view of Loveridge's data and conclusions and the results from the study of specimens recorded in this paper, I believe *schodei* Vogt is a synonym of *brevipes* Boettger.

Section Leiolopisma

LYGOSOMA (LEIOLOPISMA) NOCTUA NOCTUA (LESSON)

Lesson, Voy, Coquille Zool. II 1830, p. 48, pl. III, Fig. 4.

BYU 7325, 7358, 7359, 7388-7389	Morotai	(E. Reimschiissel)	November, 1944
BYU 7407, 7597, 7632-40, 7772	Morotai	(E. Reimschiissel)	January, 1945
BYU 7801, 7822	Morotai	(E. Reimschiissel)	February, 1945

Rostral broader than high, in contact with the frontonasal by a broad straight suture; nostril in the nasal; no supranasals; posterior and anterior loreals present; praefrontals separated by contact of fron-

tonasal and frontal, which is in contact with the two anterior supraoculars; frontal as long as the frontoparietal and interparietal together; interparietal large; parietals large but in contact by only a short suture; temporals medium in size; 3 to 4 pair of nuchals; ear opening oval and smaller than the lower eyelid disk, no lobules; fifth upper labial below the eye; 4 supraoculars; 8 supraciliaries; postmental longer than the mental; mid-body scales 25–26; scales smooth, dorsal ones large; lamellae under the fourth toe 22–26; total length of largest specimen BYU 7634, 106 (42 + 64) mm.; color dark brown above, with a mid-dorsal white stripe which involves parts of two rows of scales; dark bands, back to the thighs, consisting of close set dark brown spots; along the sides are many elongate spots which give a banded appearance; throat, belly, and all the surface of the tail whitish to light brown.

As to the color in life, Reimschiissel recorded the following: A yellow mark on head connected with a yellow line to the hind legs; body black with a mottling of white on the sides and legs; eyes black; gives birth to young. Collected on an unknown palm tree.

LYGOSOMA (LEIOLOPISMA) FUSCUM FUSCUM (DUMERIL AND BIBRON)

Dumeril and Bibron, Erp. Gen. V, 1839, p. 759.

BYU 7339-42, 7349, 7350-53, 7382	Morotai	(E. Reimschiissel)	October, 1944
BYU 7392-93, 7400, 7402-3, 7405-6	Morotai	(E. Reimschiissel)	November, 1944
BYU 7407, 7512-14, 7543-46, 7589	Morotai	(E. Reimschiissel)	December, 1944
BYU 7595 7620, 7622-23, 7625-27	Morotai	(E. Reimschiissel)	January, 1945
BYU 7629, 7770, 7787, 10193-10194	Morotai	(E. Reimschiissel)	January, 1945

Rostral broader than high, with a long straight suture between the frontonasal; latter broader than high; nostril in the nasal; no supranasals; frontal not longer than the frontoparietal, in contact with the two anterior supraoculars; 4 supraoculars; 7 to 8 supraciliaries; interparietal small; parietals in contact; a pair of nuchals and temporals; 4 upper labials before the subocular; 6 lower labials; submental larger than the mental; dorsal scales with two to three keels; 32–36 mid-body scale rows; 28 to 33 lamellae under the fourth toe; total length of one large specimen BYU 7412, 128 (46 + 82) mm.; average body length 45 mm., tail length 74 mm. Color dark brown above, whitish on underside in the majority of the specimens. A few have a dark streak from the eyes extending backwards along the flanks.

Reimschiissel observed that in life specimens were light brown on the body, with white abdomens in the main; some with two very light white lines from the eyes to forelegs, abdomen light in color but changing to a yellow orange at hind legs.

Mr. Walter C. Brown of Northwestern University thinks this Morotai population of *L. fuscum* may represent a new race. An examination of specimens from many of the islands of this area may throw more light upon speciation of the *fuscum* complex. Loveridge has recognized four races of *fuscum* in the New Guinea fauna. For the present, it is probably best to consider the Morotai specimens as indicated above.

LYGOSOMA (LEIOLOPISMA) NOVAEGUINEAE MEYER

Meyer, Mon. Berl. Ac. 1874, p. 132.

BYU 7343, 7354-55, 7365, 7367, 7415	Morotai	(E. Reimschiissel)	October, 1944
BYU 7436, 7447, 7558-60, 7575, 7577-8	Morotai	(E. Reimschiissel)	November, 1944
BYU 7582-6, 7734, 7743, 7788, 7790-98	Morotai	(E. Reimschiissel)	January, 1945
BYU 7816, 7817, 7820 and 26 untagged specimens.	Morotai	(E. Reimschiissel)	February, 1945

Rostral twice as broad as high, broadly in contact with the frontonasal; no supranasals; lower eyelid with a large transparent disk; ear opening round, with small anterior lobules, farther from the orbits than the nostrils; 4 supraoculars; 7 supraciliaries; frontal in contact with the two anterior supraoculars; single anterior loreal; frontoparietal single; interparietal distinct; parietals in contact; a pair of nuchals and a pair of temporals; subocular large, 6 to 7 upper and 6 lower labials; mental broad and narrow; first chin-shield in contact with first and second lower labials; lamellae under fourth toe 21–23; fingers 4, short; toes 5. Scale rows around the mid-body, 25–28.

Brown on dorsal with a lateral dark whitish edged band, lips with black bars on labials, ventral portions white with some black spots anteriorly and posteriorly. Total length 89 (34 + 55) mm. The series of 58 specimens are rather uniform in size and color.

Mr. Reimschiissel collected the above specimens in the forest debris; they are common about newly cleared areas. The New Guinea and Morotai specimens differ slightly in the number of rows of body scales and number of lamellae under the fourth toe.

EMOIA CAERULEOCAUDA **REIMSCHIISSELI** TANNER, n. subsp.

BYU 7312, 7332-7333, 7335-8, 7409-11	Morotai	(E. Reimschiissel)	October, 1944

BYU 7416-23, 7491-99, 7500-7, 7509-25	Morotai	(E. Reimschiissel)	December, 1944
BYU 7527, 7550-3, 7556, 7567-70, 7572-3	Morotai	(E. Reimschiissel)	January, 1945
BYU 7681-2, 7684, 7686-87, 7689-96	Morotai	(E. Reimschiissel)	February, 1945
BYU 7698, 7699, 7700-11, 7725, 7880	Morotai	(E. Reimschiissel)	February, 1945

Rostral broader than high (2.8–1.5) mm., in contact with the nasal, supranasal, and frontonasal; the frontonasal contact is a straight suture, about one-half the width of the frontonasal which is broader than long. Nostril large surrounded by the nasal, supranasal and postnasal scales; praefrontals widely separated by an arching suture of the frontonasal with the frontal, praefrontals shorter than the frontal; frontal as long as the frontoparietal plate; interparietal present in 11.5 per cent, partially separated from the frontoparietal in 21 per cent, and absent in 67.5 of the 102 specimens counted; parietals large, forming a straight suture behind the frontoparietal, a pair of large nuchals and temporals; 4, rarely 5 supraoculars, the anterior two in contact with the frontal; 8 superciliaries; eyelid with a transparent disk which is equal in length to the ear opening; large subocular, which is as long as any two of the four anterior upper labials; six lower labials; anterior and posterior loreals well developed; mental large, bordered by a small wedge-shaped first lower labial and a large postmental; first pair of chin-shields in contact, second pair separated by a small scale. Mid-body scale rows 29–33; only ninety specimens were counted, which shows a distribution as follows: 5 (29), 54 (30), 17 (31), 13 (32), 1 (33); an average of 30.5–; lamellae under the fourth toe 33–39, distributed as follows: 3 (33), 17 (34), 29 (35), 18 (36), 12 (37), 6 (38), 3 (39), an average of 35.24.

Mr. Reimschiissel made colored drawings and reported the following concerning live specimens of this species: Identified by three yellow stripes on the back with yellow spots on sides. Young ones have a clear white tail, older ones a dirty white. On side of throat is a patch of orange color, underside white, as well as abdomen. The small scales of the head and sides have an irridescent sheen. Lays eggs and feeds on insects.

The yellow and orange colors have faded to white in the preserved specimens and the interspaces are dark brown to black, the ventral scales white. Many of the specimens, young, as well as adults, do not have the stripes, but are uniform light to dark brown.

The scales of the back and sides are slightly keeled with two to three short keels. About ten rows of scales on the back and the same

number of ventral ones are larger than the lateral scales. The legs, especially the back of the thighs, are spotted. The average body length is 50 mm. and tail 70 mm. BYU 7332 has a length of 137 (46 + 91) mm. The tail varies more than the body in length.

Type: BYU 7416, Morotai, December, 1944, E. Reimschiissel.

Collected in the coral ledges where there is low vegetation. Mid-body scales 30, fourth toe lamellae 35, length 136 (56 + 80) mm. Uniform dark brown on head, back and tail, under color blackish on throat, belly and proximal portion of the tail, light colored on and around the legs.

Paratypes: 80 specimens in the above series are designated as paratypes. Type and paratypes in the Herpetological Collection at Brigham Young University. Four paratypes, BYU 7334, 7424, 7508, and 7697 are deposited in the Stanford University Natural History Museum, California.

I am pleased to dedicate this new race to Mr. Reimschiissel who worked so assiduously at collecting a large series of Morotai reptiles.

After an analysis of conclusions relative to the status of this species and its races by such workers as Brongersma, 1933; Burt & Burt, 1932; Kapstein, 1926; Loveridge, 1948; Mertens, 1930; Parker, 1925; Sternfeld, 1920; and Vogt, 1912; and in conjunction with results of my study of the Morotai specimens, I am convinced that the *caeruleocauda* race on this island is unnamed.

Loveridge has proposed that *caeruleocauda* of DeVis, 1892, be accepted as a valid species name for one of two species which have been confused under the name *L. cyanurum* as pointed out by Sternfeld and W. C. Brown. The Morotai specimens are clearly *caeruleocauda* as defined by Loveridge, but they differ in color, interparietal development, and more uniformity in mid-body scale rows, fourth toe lamellae and length of body and tail.

The characteristics of this subspecies are such that I have not been able to use any of the older names applied to species and subspecies of this complex.

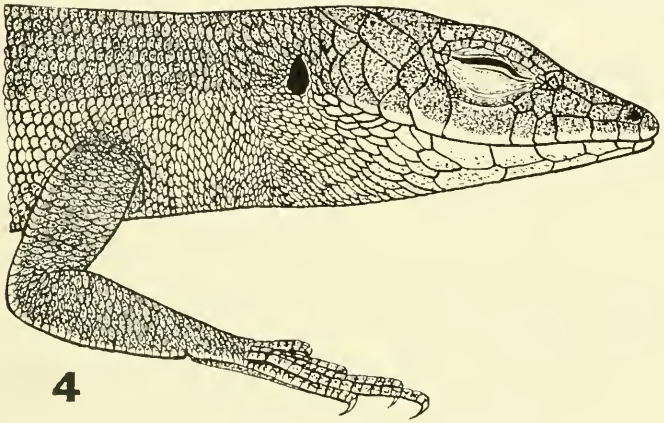
EMOIA KUEKENTHALI BOETTGER

Boettger, Zool. Anz. XVIII, 1895, p. 117.

BYU 7648, 7784, 7732, 7825 Morotai (E. Reimschiissel) January, 1945

Rostral broader than high, contacting the frontonasal with an arching suture; nostril surrounded by a well-developed supranasal, a nasal and postnasal; eyelid with a transparent disk; ear opening oval,

guarded by three small anterior lobules, larger than the lower eyelid disk; frontonasal broader than long; praefrontals longer than broad and in contact; parietals in contact behind the frontoparietal; no inter-



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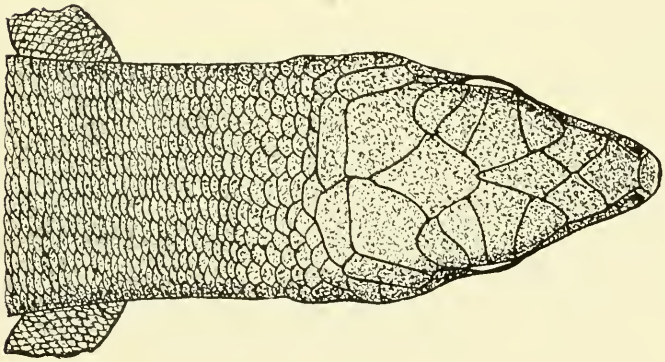

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Figs. 4 and 5. *Emoia kuckenthali* Boettger.
Side and dorsal view of head region. 3x.

parietal present; a pair of large nuchals and temporals; 4 supraoculars; 8 supraciliaries; 5 anterior labials before the large subocular; mental as broad as the rostral; submental longer than the mental; first pair of chin-shields in contact, second pair separated by a wedge-shaped scale; mid-body scale rows 42; fourth toe lamellae 52; total length BYU 7648, 167 (67 + 100) mm. Brown above with a black streak extending from the eye to above the shoulder; under color whitish;

dorsal scales with 4 to 5 keels, larger than the lateral ones; hind leg and toes reaching axilla; praeanal scales slightly enlarged.

The scalation of this species is accurately given in the accompanying figures 4 and 5.

EMOIA SOREX BOETTGER

Boettger, Zool. Anz. XVIII, 1895, p. 118.

BYU 7360, 7362,
7728-9 Morotai (E. Reimschiissel) December, 1944; January, 1945

Snout long-and pointed; rostral broader than high; nostril between three scales, a supranasal, a nasal, and a postnasal; frontonasal in a diamond shape, slightly broader than long; praefrontals almost in contact, as broad as high; frontal as long as the frontoparietal, in contact with the two anterior supraoculars; a small interparietal, the parietals in contact behind it; a pair of nuchals and temporals; the palpebral disk larger than the ear opening; 8 lower labials, the fifth one is the large subocular; mental larger than the rostral, postmental large; mid-body scale rows 29; lamellae under the fourth toe 45–47; total length BYU 7728, 166 (53 + 113) mm.

Color above a lead grey intermixed with bluish scales; blue all along the lateral parts of the head, body and tail; under parts whitish, with a bluish green luster; scales smooth, large ones on the dorsal and ventral parts. Praeanal scales large.

This is one of the most beautiful species of Lygosoma yet studied from Morotai. Mr. Reimschiissel collected this species along with specimens of *L. c. reimschiisseli* and *L. novaeguineae*.

SNAKES

Family Typhlopidae

TYPHLOPS FLAVIVENTER PETERS

Peters, Mon. Berl. Ac. 1864, p. 271.

BYU 7737-38 Morotai (E. Reimschiissel) December 14, 1944

This species was reported in my previous study, 1948.

Family Boidae

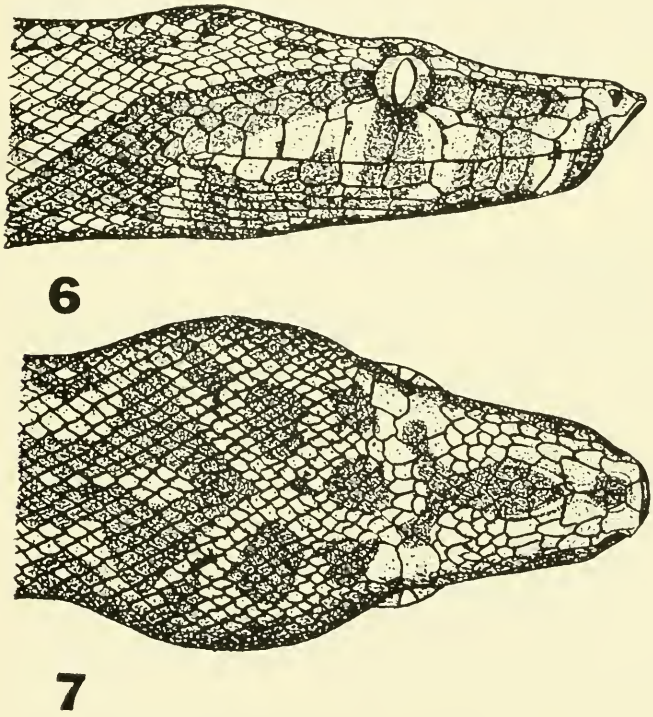
ENYGRUS CARINATUS (SCHNEIDER)

Schneider, Hist. Amph. II 1801, p. 261.

BYU 7384, 7478, 7484 Morotai (E. Reimschiissel) November, 1944
BYU 7783, 7794 Morotai (E. Reimschiissel) January, 1945

Snout prominent, mental closing on base of rostral which projects forward at an angle and is not visible from above; canthus rostralis well developed; nostril in the nasal; two larger scales over the right eye, one over the left; seven scales between the eyes; eyes bordered by 10–12 scales; 11 upper and 13 lower labials; 38 mid-body keeled scales; gastrosteges 178; urosteges 38; anal undivided. Color white with dark brown markings along the mid-dorsal and lateral area. Total length of specimen BYU 7384, 350 (304 + 46) mm.

Figures 6 and 7 give the color and scalation of the specimen described above.



Figs. 6 and 7. *Enygrus carinatus* (Schneider).
Side and dorsal view of head. 4x.

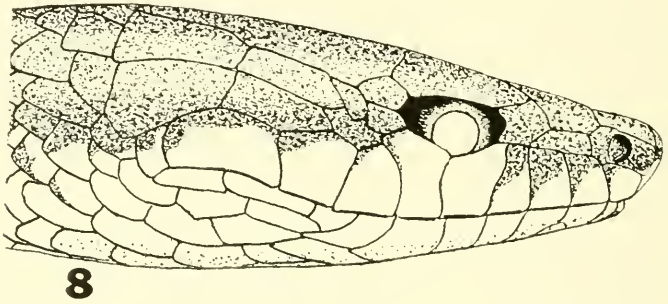
Family Colubridae

AHAETULLA CALLIGASTER CALLIGASTER (GUNTHER)

Gunther, Ann. Nat. Hist. (3) XX 1867, p. 53.

BYU 7479, 7480 Morotai (E. Reimschiissel) December, 1944
BYU 7592, 7644 Morotai (E. Reimschiissel) January, 1945

Rostral broader than high, visible from above in contact with the internasals, the latter not as broad or as long as the praefrontals; frontal shorter than the parietals; temporals 2 + 2; loreal 1; preocular 1; postoculars 3; 9 upper and 10 lower labials; 5 lower labials in contact with the anterior chin-shield; 13 rows of mid-body scales; gastroteges 195–196; urosteges 117–118; anal divided.



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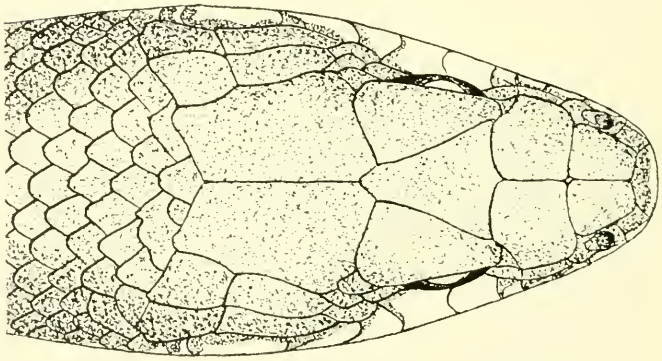

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Figs. 8 and 9. *Alhactulla c. calligaster* (Gunther)
Side and dorsal view of head. 3x.

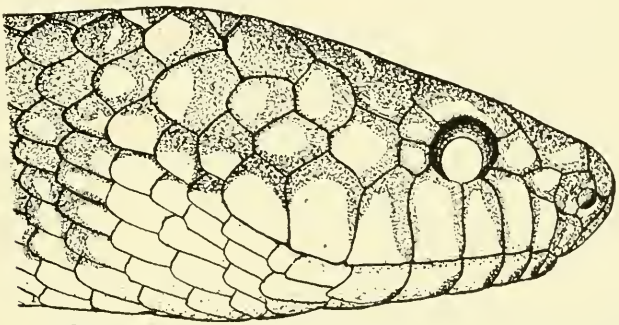
Total length of BYU 7480, 1338 (968 + 370) mm. Color black dorsal and ventral, except the chin, upper and lower labials which are white. See figures 8 and 9 for scalation and color of specimen BYU 7480.

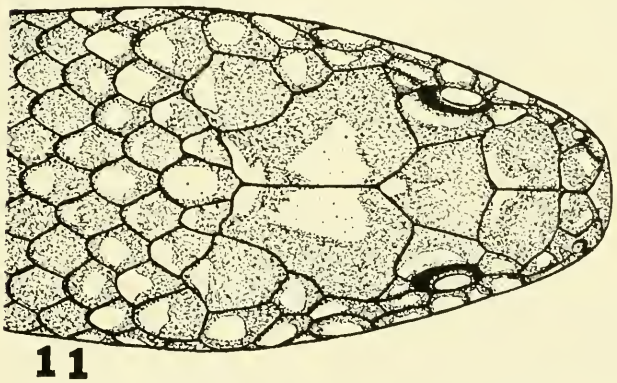
TROPIDONOTUS TRUNCATUS (PETERS)

Peters, Mon. Berl. Ac., p. 399, 1863.

BYU 7783 Morotai (E. Reimschiissel) January 6, 1945

Rostral almost as high as broad, visible from above, making a broad straight suture with the internasals, which are smaller than the praefrontals; frontal two-thirds the length of the parietals; loreal as broad as long; 2 prae- and 2 postoculars; temporals 1 + 1; 8 upper and 9 lower labials; 3 lower labials in contact with the first pair of chinshields which are shorter than the posterior pair; 15 rows of mid-body scales; gastrosteges 155; urosteges 48; anal divided; total length 450 (370 + 80) mm.





Figs. 10 and 11. *Stegonotus batjanensis* (Gunther)
Side and dorsal view of head. 4x.

Color black above except for a white nuchal band and dark brown on head; ventral black except some white mottling on the chin, labial and anterior ventral scales. Mr. Reimschiissel collected this specimen on January 6, 1945, in the timber near camp. It was black in color when alive.

This specimen has a greater number of gastrosteges, urosteges and

differs some in color from the descriptions given of *T. truncatus*. It may represent a new race, but more specimens should be available for critical study.

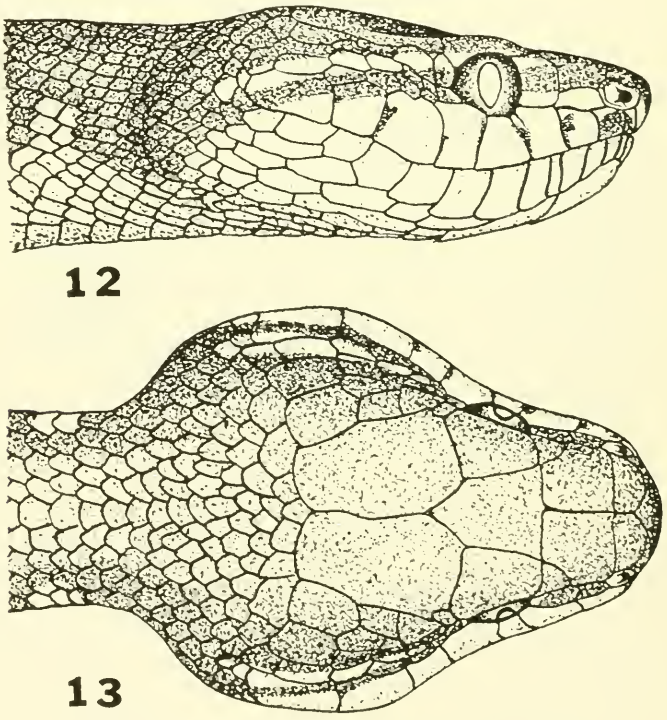
STEGONOTUS BATJANENSIS (GUNTHER)

Gunther, Ann. Nat. Hist. (3) XV 1865, p. 93.

BYU 7482 Morotai (E. Reimschüssel) December, 1944

Rostral broader than high, visible from above, making an arching contact with the internasals; the latter half the length of the praefrontals; frontal longer than the praefrontals; parietals large; loreal longer than deep; one praeocular and two postoculars; temporals 1+1; 8 upper and 10 lower labials; 3 lower labials in contact with the anterior chin-shield; 17 rows of mid-body scales; gastrosteges 211; urosteges 74; anal divided. Total length 905 (700 + 205) mm.

Color above greyish brown; ventrals yellowish with greyish lateral margins; head and neck yellowish except for some grey on top of head. For head and color scalation see figures 10 and 11.



Figs. 12 and 13. *Boiga i. irregularis* (Merrem). Side and dorsal view of head. 2x.

BOIGA IRREGULARIS IRREGULARIS (MERR.)

Merrem, Brchst. Uebers, Lacep. IX 1802, p. 239, pl. XXXVII, fig. 1.

BYU 7481, 7483, 7601, 7602 Morotai (E. Reimschiissel) December, 1944
BYU 7731, 7821, 7869, 7900 Morotai (E. Reimschiissel) February, 1945

Rostral broader than deep, visible from above; internasals shorter than the praefrontals, the latter broader than deep; 1 prae- and 2 postoculars; 9 upper labials, with 4th, 5th, and 6th entering the eye; 12–13 lower labials, first five in contact with the anterior chin-shield, which are equal in length to the posterior pair; 19 mid-body rows of scales; gastrosteges 242–245; urosteges 102–112; anal entire; total length BYU 7869, 703 (545 + 158) mm.

Color grey above with dark transverse bands, a dark streak behind the eyes; upper labials and ventrals whitish. Reimschiissel reports this species as being a burnt yellowish and brown with diagonal markings on the back. Two specimens taken from under a trash pile of coconuts, fronds and boards. The color markings of specimen BYU 7900 are shown in figures 12 and 13.

ACKNOWLEDGMENTS

I am grateful to Dr. Walter C. Brown of the Biology Department of Northwestern University, who spent two weeks in December, 1948, studying the collections from the South Pacific Islands here at the Brigham Young University, for his help and advice in making determinations of the species of this report.

I also owe a debt of gratitude to Ernest Reimschiissel for his untiring efforts in collecting, preparing, and shipping reptiles and insects from Morotai Island. The drawings were made by Mr. James Little, a major student in Entomology at Brigham Young University.

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A NEW SPECIES OF GILA FROM NEVADA (CYPRINIDAE)[1]

VASCO M. TANNER
Brigham Young University

Even today, one frequently encounters some individuals who contend that speciation is not going on among the plants and animals of the earth. That isolation plays a role in establishing genetic changes of animals is well demonstrated in the fish fauna found in eastern Nevada. In this short paper, I wish to call attention to another geminate species found in the old White River drainage system.

With several students, in May 1949 and April 1950, I spent two weeks traversing the drainage system from Lake Mead to the head waters of the Muddy River, then over the divide into Pahranagat Valley, thence north from Hiko, over a dirt road which passes through some of the old White River Canyon, to Sunnyside, Hot Creek Ranch, Lund, Preston and north to Ruth and Ely. The divide between the head waters of the Muddy and Pahranagat Valley was studied and several species of reptiles collected in this area. The Coyote Springs Valley was definitely a part of the drainage course from lower Pahranagat Lake to the Home Ranch springs near the head of the Muddy River. The present topographical features from above Preston south to Lake Mead presents conclusive evidence to me that this old drainage system was once a tributary of the Colorado River. The present springs and streams were, no doubt, a part of the ancient surface water system. With the disappearance of running water which connected the springs, the fish fauna of the system was trapped in the dozens of springs and short streams which, in time, have become isolated. Some species persisted in the warm springs, 80° – 90°F, while others survived in the cool water springs 59° – 70°F. Thus for hundreds of years the Pahranagat Valley and White River springs have been isolated from the Colorado River drainage. This separation of the fishes of these valleys may be used to illustrate in a remarkable manner David Starr Jordan's law of geminate species, which he has promulgated as follows: "Given any species in any region, the nearest related species is not likely to be found in the same region, nor in a remote region, but in a neighboring district separated from the first by a barrier of some sort, or at least by a belt of country the breadth of which gives the effect of a barrier." Some of the fishes of these valleys

1 Contribution No. 122, Department of Zoology and Entomology.

have their nearest relatives in the Colorado River and its nearby tributaries, the Virgin and Muddy Rivers. Examples are the species of Gila, described below, and the catostomid, *Notolepidomyzon intermedius* Tanner found in White River County around Preston and Lund.

Hubbs and Miller, in two very useful papers, have pointed out "the strong tendencies toward isolation, endemism and relict distribution that characterize the fishes of these areas."

The species described below was first found in the Hiko springs on Mrs. Whipple's ranch in May, 1949. Upon seeing this cyprinid among *Cyprinodon macularius baileyi*, I was greatly interested since it was so new looking. In the water it was an olive green on head and back with silvery sides and venter; then too, it was more active and stream-lined than its associates. We put out wire traps, but after hours of trying we only collected three specimens, BYU 8981, 8980 and 9084. These proved to be so different from other Gila specimens from the Colorado River drainage that I again went back into the area in April, 1950 and obtained three more specimens from Crystal Spring, six miles south of Hiko. Two of these, BYU 9958 and 9959, are larger specimens. In life they are similar in color to the Hiko spring specimen, except that the more mature ones are heavily blotched as shown in figure 1. They were very active and hard to catch. Locally they are called trout and will take the baited hook. They are scarce and under the present method of dealing with the water from these springs I surmise that they may, in the near future, become extinct.

GILA **JORDANI** Tanner, sp. nov.

Description of the type specimen BYU 9959: Head 3.6+; depth 4.3+; eye 6; D. 9; A. 9; teeth 2, 5–4, 2. Body somewhat elongate, more robust than *Gila elegans*; back only sightly elevated and head depressed; least depth of caudal peduncle about one-fifth of its length and 3¼ in length of head; mouth width 18 mm., the upper lip just below the level of the lower part of the orbit; eyes, small, anterior; fins about as in *G. robusta;* pectorals not reaching the ventrals in any specimens of this species; caudal fin forked; dorsal set a little back of the ventrals; middle caudal rays less than half the length of the upper caudal lobe; proximal portions of the fins in life whitish, in preservative an orange color; scales 26-91-14; in the series 89 to 94 on the lateral line; 26 to 27 above and 13 to 14 scales below the lateral line. In life the body is greenish with black blotches, while the preserved specimens are a lead gray with black blotches and white belly;

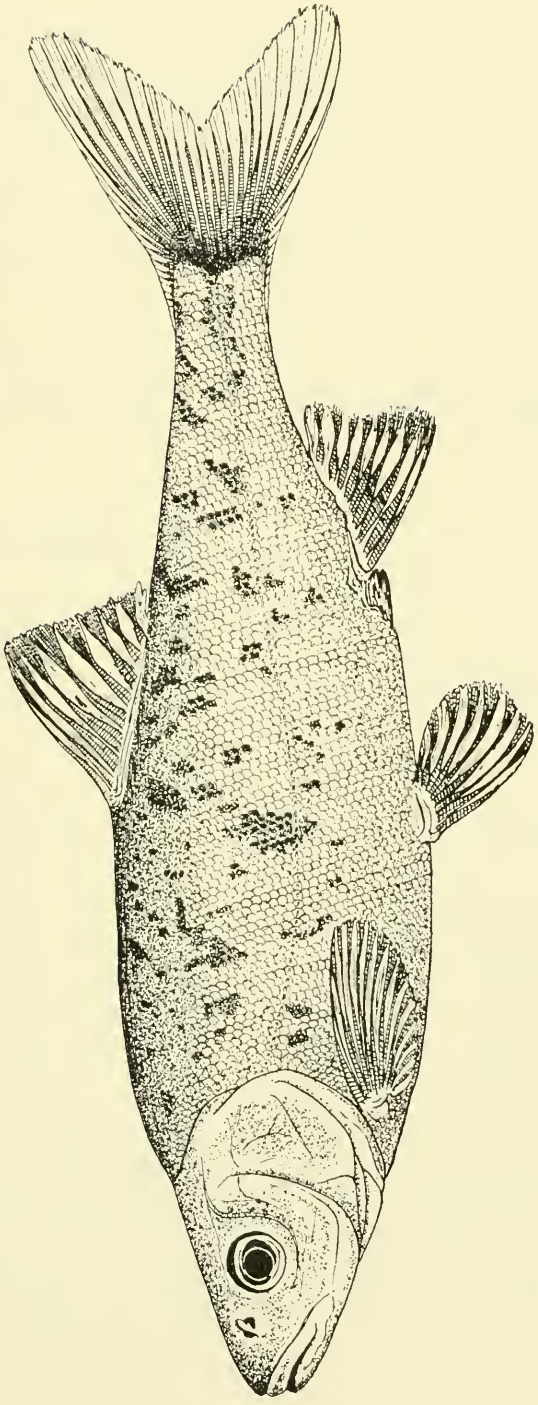

Fig. 1. *Gila jordani*, new species. Drawing of the type specimen from Crystal spring, Lincoln Co., Nevada. 1.5+.

Measurements of the type and paratypes of *Gila jordani* in millimeters.

Locality	Hiko spg.	Hiko spg.	Hiko spg.	Crystal spg.	Crystal spg.	Crystal spg.
Numbers	BYU 8981	BYU 8980	BYU 9084	BYU 9958	BYU 9959	BYU 9960
Standard length	72	68	85	185	158	83
Dorsal origin to tip of snout	39	36.5	45	107	83	43
Pelvic origin to tip of snout	36.5	35	43	99	78	55
Anal origin to caudal base	25+	23.5	30	71	55	30
Body, greatest depth	17	15	17	50	42	18
Greatest width	11	10	12	38	30	14
Head, length	22	20	25	58	43	24
Depth	14	12.5	16	43	34	18
Width	12	11	14	38	28	15
Caudal peduncle, length	15	14	19	74	60	29
Least depth	6	5.5	6.5	14	13	6.5
Interorbital, least bony width	6.5	6.0	7.5	18	14	8.5
Opercle, greatest length	8	7	10	20	14	9
Snout, length	6.5	5.7	8.0	9	8	5.6
Eye, length	5.0	5.0	5.6	9.0	7.0	5.5
Orbit, length	5.5	5+	6.0	9.1	7.1	5.5
Mouth, width	7	6	8.5	24	18	9.0
Upper jaw, length	8	6+	8.3	16	13	7.5
Mandible, length	6.5	5.5	6.7	18	14	8.0
Dorsal fin, depressed length	16	16	.	40	32	20.0
Basal length	10	9.5	11	26	20	12.0
Anal fin, depressed length	14	14	16	39	26	17.0
Basal length	9	9	10	23	16.5	10
Middle caudal rays, length	8	8	.	17	16.0	9.0
Upper caudal lobe, length	21	20	.	47	36	24.0
Pectoral, length	13	13	15	29	25	17
Pelvic, length	11.5	11	14	26	22	15
Dorsal rays	9	9	9	9	9	9
Anal rays	9	9	9	9	9	9
Pelvic rays	9	9	9	9	9	9
Scales	27-93-13	27-93-13	27-94-13	27-91-14	26-91-14	27-89-14

young specimens have a silvery color when in spirits. Type about 6¼ inches long.

TYPE LOCALITY: Crystal Spring, Pahranagat Valley, Lincoln County, Nevada. Water clear, cool, 59°F, and good to drink. This spring flows several second feet of water and is used for irrigation. The only other fish taken in Crystal Spring was *Cyprinodon macularis baileyi* Gilbert. With wire fish nets I collected about 100 specimens of this species. In the water *baileyi* is blackish in color with white stripes.

PARATYPES: In the table above are the measurements of the type and two paratypes, BYU 9958 and 9960 from Crystal Spring and three paratypes, BYU 8981, 8980 and 9084 from Hiko Spring. All type specimens are in the Ichthyological Collection at Brigham Young University.

REMARKS: *Jordani* is a small scaled species belonging to the subgenus Gila, as proposed by Miller, 1945. It is related to *G. robusta*. It differs from *robusta* in body proportions such as head and depth and by being less elongate; by having more scales above, below, and on the lateral line; and in life by having a greenish color intermixed with black blotches.

I am pleased to name this species for David Starr Jordan, a great ichthyologist and educator, which is but a small way to show my appreciation for his and Mrs. Jordan's many kindnesses to me while I was a student at Stanford University.

I wish to acknowledge the help of Mr. Leland Lamoreaux, Principal of the High School at Alamo, and Mr. and Mrs. Bert Allred of Preston, Nevada for their help and kindness to us during our stay in this area. Mr. Lamoreaux spent some time in the field as our guide. I also wish to express appreciation to Clayton Farnsworth, Dale Parker and Don Skousen, graduate students who accompanied the writer in the field in 1949 and 1950.

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A NEW GENUS OF PLETHODONTID SALAMANDER FROM MEXICO [1]

WILMER W. TANNER
Assistant Professor of Zoology and Entomology
Brigham Young University

Among the salamanders of the family Plethodontidae is a large and diversified group of terrestrial and arboreal species ranging from central Mexico southward through Central America and into northern South America. When the family was established by Gray in 1850, there appears to have been only one species *Bolitoglossa platydactylus* (Cuvier) recognized from this area. In the succeeding years many new species were added, until now there is a rather imposing list of approximately eighty-five well-established species.

During the last three decades such workers as E. R. Dunn, K. P. Schmidt, H. M. Smith, L. C. Stewart, E. H. Taylor, and others have added considerably to the numbers of specimens available in collections, to the numbers of new species, and to the general understanding of the southern segment of this family. Unfortunately, there has not been a unanimity of opinion concerning the numbers of genera that should be recognized among the Mexican and Central American lungless salamanders. Herpetologists appear, however, to have accepted, in a general way at least, the species as they are now established. This fact is particularly true in regard to that group of wormlike species belonging in the genus *Oedipina*. The relationships, however, of these wormlike species to other Mexican and Central American species, as well as an accepted generic interpretation of the *Oedipina* complex, has not been clearly formulated.

Dunn (1924:95 and again in 1926:434) considered the species *Oedipina parvipes* (Peters) as representing an interrelated species which broke down the distinction between the wormlike forms (genus *Oedipina*) and the rest of the Mexican and Central American species, which he includes in a single genus *Oedipus* Tschudi. Unfortunately Dunn did not list the interrelating characters he used to link the wormlike species with the normal forms.

Piatt, 1935, in his studies of the throat muscles of *Oedipina complex*, *Oedipina parvipes*, and *Oedipina uniformis*, found them to differ

(1) Contribution No. 123 from the Department of Zoology and Entomology, Brigham Young University.

from all other species of the then accepted genus *Oedipus*. Piatt found the relationships of the *M. intermandibularis* to the *M. geniohyoideus* to show the greatest differences, and concludes by saying, "The presence of such a condition is another argument favoring a schism in the genus: the wormlike group reclaiming the name *Oedipina*."

Taylor, 1944:226, re-established the genus *Oedipina* Keferstein and included in it the same species listed by Dunn, 1926:33, in his group IV of the composite genus *Oedipina* Tschudi. In conclusion, Taylor suggested, "There is some doubt whether all the elongate wormlike forms of Mexico and Central America are congeneric with *uniformis* and *lineola*. The skeletal characters of most of the group are unknown and there is a probability that an examination of the skeletons will prove that more than a single genus is represented." In this study, Taylor failed to find the interrelating characters between the wormlike species *parvipes* and the other species from Mexico and Central America as suggested by Dunn.

In 1946 Dr. William A. Hilton collected a series of *Oedipina parvipes* and *Oedipina complex* from Barro Colorado Island, Canal Zone. After examining the skeletons of some of these and comparing them with those of other plethodontids, he described the genus *Oedopinola*. In previous studies Hilton had examined representatives of nearly all of the then known Mexican and Central American genera of plethodontid salamanders. Only *Parvimolge* and *Haptoglossa* appear not to have been seen by him. Hilton appears not to have seen the genotype *Oedipina uniformis* Keferstein, or any other typical *Oedipina* prior to his collecting the two Panamanian species, although *Spelerpes (Oedipina) lineola* Cope was examined. Presumably the description of the genus *Oedopinola* (1946:38) is based primarily on the difference existing between the skeletons of the two species collected in Panama and the wormlike species *lineola* from Mexico. The following from his description may aid in clarification, "but there are so many skeletal differences between them and members of the genus *Oedopina*[2] that a new generic name is suggested. This might be *Oedopinola*, a genus closely related to *Oedopina* but separated from it by the following differences: (1) Shorter vertebrae, (2) No alar folds on vertebrae, (3) Large number of vertebrae before the sacral, (4) Different carpus and tarsus."

Since Hilton had access to the work of Dunn (1926) and refers to the work of Taylor (1944), it is seemingly safe to assume that the statement "and other members of the genus *Oedopina*," is intended to

2 The generic term as used by Hilton is misspelled. It should read *Oedipina*.

include the following species of the genus *Oedipina: uniformis, elongatus, collaris, alfaroi,* and the atypical Mexican representative *Spelerpes lineola.* The term "them" obviously refers to the two Panamanian species *Oedipina parvipes* and *Oedipina* complex.

Recently I have had the rare opportunity to examine well over fifty species of Mexican and Central American Salamanders.[3] Among this number were the following species of the genus *Oedipina: uniformis, complex, parvipes, serpens, syndactyla, elongatus,* and two undescribed species from Central America. A comparison of the external and throat anatomy indicates a close relationship between the above listed Central American species of the genus *Oedipina.* I have found the typical species of *Oedipina* to be a very uniform group. I have not found, as yet, in either the external anatomy nor in the visceral cartilages and their associated muscles any indication of a characteristic that would link, through *Oedipina parvipes,* the genus *Oedipina* to the other plethodontid salamanders of Mexico and Central America.

On the basis of the external characters, the skeletal, and the throat anatomy, the genus *Oedopinola* is not tenable. A comparison of the two Panamanian species included in that genus by Hilton with the genotype *Oedipina uniformis,* shows a very similar set of characteristics. The throat myology and the hyobranchial appartus are the same in the three species. The verterbae are the same and with a similar number (nineteen or twenty) preceding the sacral. The external anatomy is also that of congeneric species.

When a typical *Oedipina* is compared with the Mexican species, *Spelerpes lineola* Cope, it is evident that Hilton had assumed *S. lineola* and *O. uniformis* to be similar, certainly congeneric species. A comparison of *S. lineola* with *O. uniformis* gives the same results as were obtained by Hilton in his comparison of *S. lineola* with *O. parvipes* and *O. complex.* It is therefore necessary to place the genus *Oedopinola* Hilton as a synonym under the genus *Oedipina* Keferstein and to place the species *Spelerpes lineola* Cope in a new genus to be known as

LINEATRITON W. W. Tanner, genus novum

GENOTYPE SPELERPES LINEOLA Cope. Plate I, figs. 1-10

Greatly elongate, slender-bodied terrestrial salamanders; tail cylindrical and in adults approximately twice as long as the combined

3 I desire to express my gratitude and thanks to Dr. Edward H. Taylor for the use of material and for helpful criticism and advice; also to Dr. William Hilton and the officials of the Museum of Comparative Zoology and the Chicago Museum of Natural History for the use of specimens.

length of head and body; fourteen costal grooves; arms and legs short, adpressed limbs separated by nine complete costal folds. Hands and feet incompletely webbed, basal phalanges grown together; the terminal and half of the adjoining phalanges of the two middle fingers and the three middle toes free. Snout short and broadly rounded; nostrils small; tongue entirely free, sublingual fold large and distinct; fifteen elongate body vertebrae, centra twice as long as wide, a broad, bony alar expansion extending caudad from the transverse processes, widest anteriorly and becoming narrower as it extends posteriorly; alar expansion absent on caudal and sacral vertebrae; caudal and sacral vertebrae with a crest on the haemal arch, crest serrate in the anterior and smooth in the more posterior caudal vertebrae; body vertebrae without a dorsal crest. Skull well ossified; frontal process of premaxilla single anteriorly and narrowly divided posteriorly. A single row of pleurodont teeth on maxilla increasing in size toward the premaxilla; premaxilla with large teeth in the male; proximal ends of the ceratohyals flattened, spatulalike, medially with two lobes, distally attenuate, hooked and attached to the squamosal by a ligament; second basibranchial absent. *M. intermandibularis anterior* present, no median raphè; *M. gularis* large, approxmiately one third of its insertion at the mid-ventral line; *M. quadrato-pectoralis* present, large, its origin on posterior edge of squamosal and dorsal tip of quadrate; *M. geniohyoideus medialis*, straplike, its origin on the posterior surface of mandible, approximately as wide at the origin as at the insertion; *M. geniohyoideus lateralis* undivided, origin simple, *M. rectus cervicis* in three unequal segments, posterior as long as both anterior segments, middle segment shortest.

A comparison of some of the pertinent characteristics existing in the genera of *Lincatriton* and *Ocdipina* will give the more salient differences between the two genera.

PLATE I

Fig. 1. Lateral view of a caudal vertebra *Ocdipina uniformis* Keferstein.
Fig. 2. Dorsal view of a trunk vertebra *Ocdipina uniformis* Keferstein.
Fig. 3. Anterior end of a caudal vertebra *Ocdipina uniformis* Keferstein.
Fig. 4. Lateral view of a trunk vertebra *Ocdipina uniformis* Keferstein.
Fig. 5. Anterior end of a caudal vertebra *Lincatriton lincola* (Cope).
Fig. 6. Dorsal view of a trunk vertebra *Lincatriton lincola* (Cope).
Fig. 7. Lateral view of a trunk vertebra *Lincatriton lincola* (Cope).
Fig. 8. Anterior end of a trunk vertebra *Ocdipina uniformis* Keferstein.
Fig. 9. Lateral view of a caudal vertebra *Lincatriton lincola* (Cope).
Fig. 10. Anterior end of a trunk vertebra *Lincatriton lincola* (Cope).

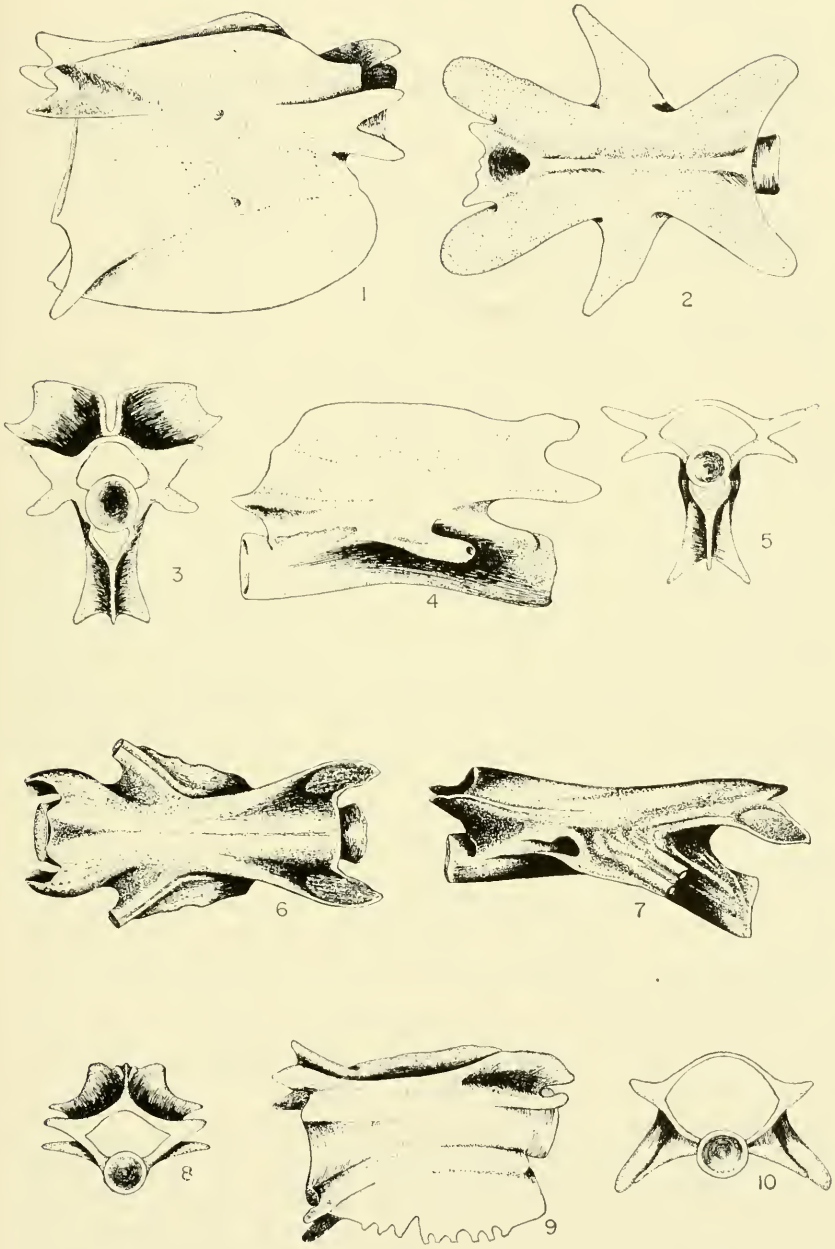

Plate I

Characters	Lineatriton	Oedipina
Costal grooves	14	17-20
Adpressed limbs covering	3-4 costal folds	5-8 costal folds
Phalanges	Middle fingers and toes incompletely webbed; terminal phalanges free.	Middle fingers and toes usually completely webbed or grown together; only the tips free.
No. of vertebrae	15 preceding the sacral	19-20 preceding the sacral
Characteristics of body vertebrae	Length of centrum twice its width; alar expansions present. No dorsal crest.	Vertebrae shorter, alar expansions absent; dorsal crest present.
Characteristics of caudal vertebrae	With a single medial dorsal crest; alar expansions absent; Haemal spine large, serrate in anterior and smooth in posterior vertebrae.	Two dorsal crests separated by a medial groove; alar expansions absent; haemal spine large, not serrate.
Ceratohyals	Proximal end spatulalike, with a median lobe.	Proximal end attenuated, rodlike; without a median lobe.
M. genohyoideus medialis	Origin on posterior surface of mandible; broad straplike.	Origin on ventral and posterior surfaces of mandible; narrow anteriorly, expanding caudally, not straplike.
M. genohyoideus lateralis	Origin on posterior surface of mandible, anterior to origin of intermandibularis anterior.	Origin on ventral surface of mandible, divided by intermandibularis anterior and the anterior slip of the posterior muscle.
M. rectus cervicis	In three unequal segments posterior segment as long as combined lengths of other two segments.	In three nearly equal segments, posterior segment only slightly longer than middle or anterior segments.
M. quadrato-pectoralis	Origin on posterior surface of squamosal and on tip of quadrate.	Origin on posterior and ventral surfaces of squamosal and on skull ventral to the squamosal.

Remarks: The genus *Lineatriton* is more closely allied to the genera *Pseudoeurycea*, *Chiropterotriton*, and *Parvimolge* than it is to the genus *Oedipina*. The relationships are more clearly seen in the throat anatomy, although the reduced numbers of vertebrae and costal grooves are also relating characteristics. The new genus is distinct from either *Pseudoeurycea* or *Chiropterotriton* by reason of the character of limbs, the entirely different type of feet, short legs, and the greatly elongate body and tail. It is distinct from the genus *Parvimolge* in having small nostrils in the adults, although young animals may have enlarged nostrils, short legs, and greatly elongate body and tail. The

elongate tail which is responsible for the resemblance between the genera *Oedipina* and *Lineatriton* has also been attained by another distantly related genus *Batrachoseps*.

In some genera of plethodontid salamanders there is a transverse chin groove extending across the throat anterior to the gular fold and beginning near, but usually located posterior to, the angle of the jaw. This chin groove is present in both *Oedipina* and *Lineatriton*. However, on the underside of the throat of all *Oedipina*, at least those which I have seen, there is a fine arched groove resting on the transverse chin groove. The arched groove extends anteriorly and curves mesiad to the mid-ventral line where the grooves on each side usually meet, immediately ventrad to the M. intermandibularis anterior. This character is lacking in *Lineatriton lineola*.

The relationship between *Lineatriton* and *Oedipina* is seemingly remote, except that both genera are composed of greatly elongate, free-tongued species. Their similarities are few, and both genera are represented by highly specialized species. This fact is particularly true of the genus *Oedipina*, in which there has been an increase in the number of body vertebrae, rather than an elongation, as in *Lineatriton;* the vertebrae, as indicated above, have been specialized; the fingers and toes are more completely webbed or grown together, and there is a noticeable specialization in the muscles and cartilages of the throat region. Equally important is the uniformity in the throat anatomy among the species of *Oedipina*.

The generic relationships suggest an adaptive radiation for Mexico, in which the genera *Pseudoeurycea*, *Chiropterotriton*, *Parvimolge*, and *Lineatriton* arose from a primitive stock, which may have been similar to *Pseudoeurycea*. The entire anatomical arrangement of the hyobranchial apparatus and its musculature is reminiscent of such a general relationship. The presumed relationship between *Lineatriton lineola* and the genus *Oedipina* turns out to be only superficial resemblance. Evidences certainly do not suggest an origin from a common prototype, but imply that the similarities are a result of convergence.

Range: The new genus is known only from central Veracruz, where it ranges between the altitudinal limits of two to four thousand feet. Whether the genus *Lineatriton* will be found to occupy a wider range must await further intensive collecting. The distribution of the genus *Oedipina* is at present restricted to the countries of Central America, although its range may be found to extend into southern Mexico. The known ranges of the two genera are at present widely separated.

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THREE NEW PREDACIOUS NEMATODES

MAX J. FIELDING

U. S. Bureau of Plant Industry, Soils and Agricultural Engineering, Salt Lake City, Utah

Three new species of predacious nematodes from various localities, one representing a new genus, were selected from the collection of the Division of Nematology, Salt Lake City, Utah, station. They are herein described as *Bathyodontus cylindricus* new genus, new species, *Discolaimium pseudoporum* new species, and *Discolaimium gigas* new species.

All drawings and measurements were made on specimens killed by gradual heat, fixed in formal-alcohol-acetic acid solution and mounted in glycerine.

BATHYODONTUS Fielding, new genus

Nygolaiminae? Predacious. Body cylindrical from the middle of the neck to a short distance in front of the anus. Lips amalgamated, practically continuous with the neck contour, bearing an inner circlet of six and an outer circlet of ten papillae. The conspicuous, granular lateral cords are about 1/3 the body width except at the extremities. Amphids small, cup shaped. A single ventral tooth is located at the base of the cylindroid pharynx. Esophageal glands apparently five. Cardia large, irregularly shaped. Intestine thick walled, with fine granules. Vulva a transverse slit, located posterior to the middle of the body. Vagina small, refractive. Ovaries two, symmetrical, reflexed. Tail hemispheroid, bearing an axial pore, indicating a spinneret-like function.

Type species: *Bathyodontus cylindricus* n. sp.

Type locality: Alfalfa field, Westmoreland, California.

The genus *Bathyodontus* is distinctive because of the ventral tooth located at the base of the pharnyx, and the axial terminal pore. It appears to be related to the genus *Oionchus* Cobb, 1913 (Jour. Washington Acad. Sci. 3(16): 432-444), which it resembles in the cylindroid body and esophagus, and the axial terminal pore.

BATHYODONTUS CYLINDRICUS Fielding, n.g., n.sp. Fig. 1, A-H

♀: 1.1 mm; a = 23; b = 3.4; c = 47; V = 7 55 7.

Body cylindrical from the middle of the neck to a short distance in front of the anus. The conspicuous granular lateral cords are about

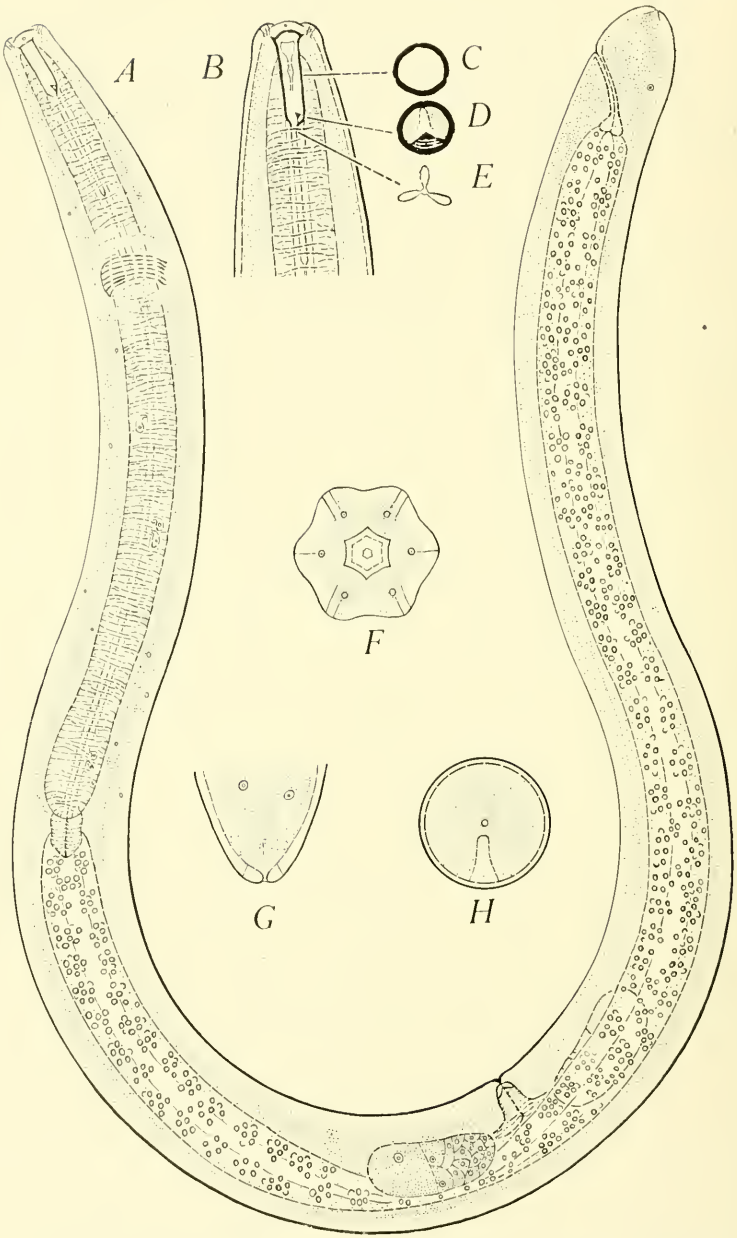

Fig. 1. *Bathyodontus cylindricus* n.g. n.sp. A—Female; x 330. B—Anterior portion of female; x 500. C—Cross section through prorhabdions; x 1330. D—Cross section through tooth; x 1330. E—Cross section through anterior esophagus; x 1330. F—face view; x 1330. G—Ventral view of posterior portion of female; x 500. H—Tail end-view; x 1175.

1/3 as wide as the body except at the extremities. Tail hemispheroid, bearing an axial terminal pore, with a valve and a large gland anterior to it on each side of the body. A dorso-ventral view, or tail end-view shows these glands to fill almost the entire tail cavity (Figure 1-G, H). Caudal pores arranged as shown (Figure 1-A, G). Lips almost continuous with the neck contour, bearing an inner circlet of six and an outer circlet of ten papillae. Amphids small, cup shaped, about 1/4 as wide as lip region. The single ventral tooth is located at the base of the cylindroid pharynx. Esophagus cylindroid, bearing the usual five esophageal gland nuclei arranged as illustrated (Figure 1-A). Cardia large, irregularly shaped. Each cell of the thick walled intestine contains a group of fine granules. No prerectum was observed, although one specimen had a slight constriction in the intestine about four anal body diameters anterior to the rectum which may have indicated the presence of a prerectum-like portion. Rectum equal to anal body diameter. Vulva a transverse slit. Vagina refractive, extending almost 1/2 the way across the body. Ovaries symmetrical, reflexed 1/2 the way back to the vulva. All specimens were young females and no eggs were observed in the uteri. Body straight when killed by gradual heat. This species was exceedingly active when observed alive.[1]

HABITAT: Eight females collected from soil in an alfalfa field, Westmoreland, California, by Gerald Thorne, 1942.

DISCOLAIMIUM PSEUDOPORUM Fielding, n. sp. Fig. 2, A-F

♀: 1.7 mm; a = 35; b = 4.6–5.0; c = 80–100; V = $^{16}48^{16}$.

Body about cylindrical from the middle of the neck to a short distance in front of the anus. Lateral organs number from 45-55 on each side of the body and are irregular in size and arrangement, and from each a connection extends through the cuticle to a pore. A cross section shows these organs to extend far into the body cavity (Fig. 2, F). Tail hemispheroid. From a lateral view there appears to be an axial terminal pore with a valve-like structure and several glands arranged anterior to it. However, from a tail end-view there is no visible external opening through the cuticle, which indicates that this structure is rudimentary. Caudal pores arranged as shown (Fig. 2 B, D). Lip region 1/2 as wide as base of neck, set off by a constriction, bearing an inner circlet of six and an outer circlet of ten papillae. Amphids stirrup shaped, almost 1/3 as wide as lip region. Spear about 2/3 as long as lip region width, the aperture occupying 1/2 its length. Guid-

(1) Personal communication to the writer by Gerald Thorne.

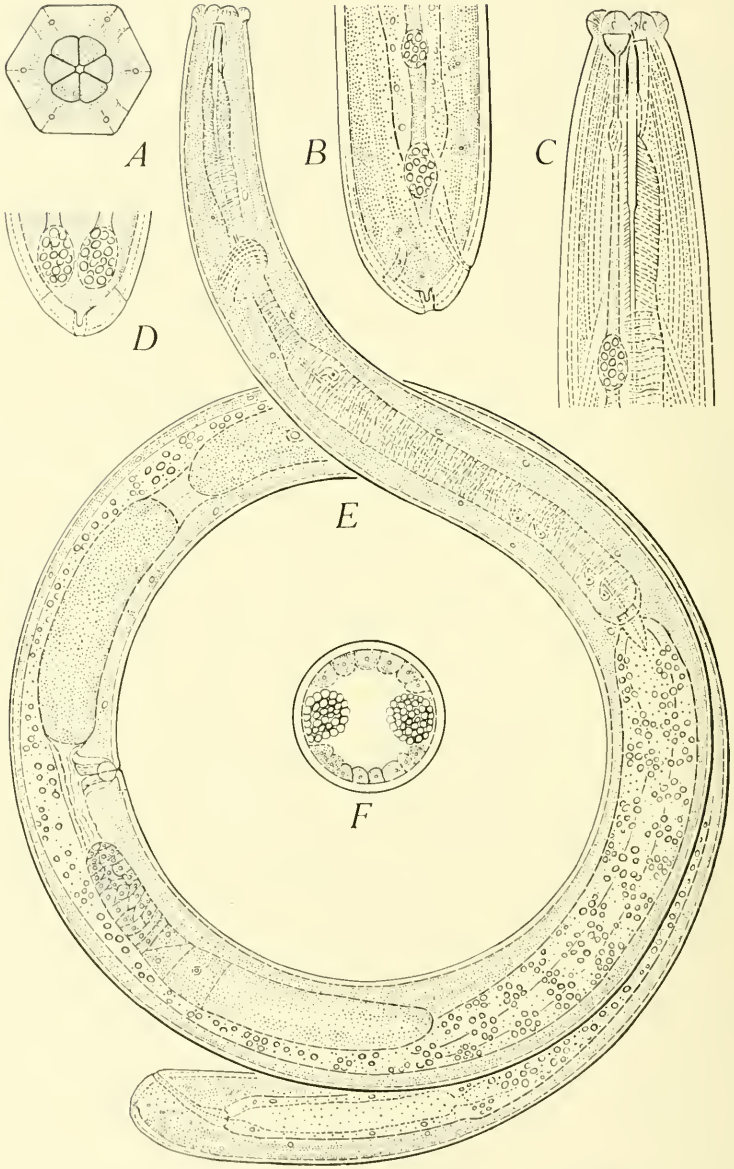

Fig. 2. *Discolaimium pseudoporum.* A—Face view; x 1060. B—Posterior portion of female; x 530. C—Anterior portion of female; x 530. D—Dorso-ventral view of tail; x 530. E—Female; x 265. F—Cross section anterior to anus; x 700.

ing ring a muscular sheath. Esophagus irregular in width anteriorly, with strong radial musculature, narrowing as it passes through the nerve ring, then abruptly expanded in the posterior 3/5. The usual five esophageal gland nuclei are present, arranged as illustrated (Fig. 2, E). A membrane-like sheath surrounds the base of the esophagus. Cardia pineapple shaped. Each cell of the thick walled intestine contains a group of large granules. Prerectum length equal to three times the anal body diameter. Rectum length equal to anal body diameter. Vulva a transverse slit. Vagina refractive, extending more than 1/3 across the body. Ovaries symmetrical, reflexed 1/2 the way back to the vulva when not displaced by developing ova. Eggs 2 1/2 times as long and 2/3 as wide as body diameter.

When killed by gradual heat, this species twists in the anterior portion so that the head is seen in a submedian view.

Diagnosis: *Discolaimium* with the above measurements and general description. Distinctive because of the axial terminal pore-like structure, and the pronounced musculature of the anterior esophagus. It is tentatively placed in the genus *Discolaimium*, although it resembles the genus *Discolaimus* in the musculature of the anterior portion of the esophagus. It probably represents the group from which these two genera were evolved.

Habitat: Six females collected from soil about the roots of corn, Sanford, Florida, by Dr. J. R. Christie, 1949.

DISCOLAIMIUM GIGAS Fielding, n.sp.

♀: 2.2 mm; a = 42; b = 4; c = 45; V = $^{10}42^{10}$.

Body almost cylindrical from the middle of the neck to a short distance in front of the anus. Cuticle with easily visible transverse striae. Lateral glandular organs number from 45-60 on each side of the body, are irregular in size and arrangement; from each a connection extends through the cuticle to a pore. Tail conoid to a rounded terminus. Four caudal pores arranged as illustrated, and in addition there appear to be a single ventral and two pairs of sub-dorsal innervations (Fig. 3, C). Lip region 1/2 as wide as base of neck, set off by a constriction, bearing an inner circlet of six and an outer circlet of ten papillae. Amphids stirrup shaped, 1/2 as wide as lip region. Spear length equal to lip region width, the aperature occupying 1/2 its length. Guiding ring obscure, muscular, extensible as spear is thrust out. Esophagus beginning as an ellipsoid bulb surrounding the junction of the spear extensions. The lumen of the slender anterior portion of the

esophagus is unusually wide but narrow where it joins the abruptly enlarged basal portion (Fig. 3, B). A membrane-like sheath surrounds the base of the esophagus. Cardia hemispheroid. Intestine apparently 12 cells in circumference, the granules fine and colorless. Prerectum and rectum lengths each equal to anal body diameter. Vulva a transverse slit; vagina extending almost 1/2 across the body. Ovaries symmetrical, reflexed 3/5 the distance back to the vulva. All specimens were young females and no eggs were present in the uteri.

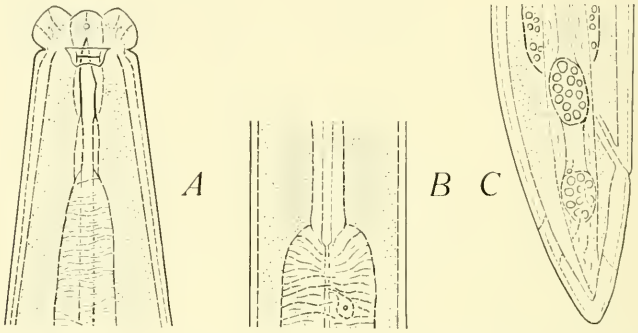

Fig. 3. *Discolaimium gigas*. A—Anterior portion of female; x 500. B—Esophagus at expansion; x 500. C—Posterior portion of female; x 500.

Diagnosis: *Discolaimium* with the above measurements and general description. Distinctive because of its large size, wide lumen of the anterior esophagus, and the caudal pores and innervations.

Habitat: Fifteen females collected from cultivated soil, Planada, California, by Gerald Thorne, 1942.

ACKNOWLEDGMENT

Grateful acknowledgment must be made to Mr. Gerald Thorne. His leadership, inexhaustible patience, sympathy, and understanding have been a constant source of inspiration from the beginning of my work in nematology. Unselfishly he gave of his time and knowledge, and because of his enthusiastic encouragement this paper was prepared.

SALDIDAE OF THE AMERICAS (HEMIPTERA)

C. J. DRAKE and F. C. HOTTES

During the past few years, the authors have had the pleasure of studying numerous collections of shore bugs, or Saldidae, kindly loaned by private individuals and various institutions. The present paper contains data on 17 species, including the description of a species new to science. Three European species — *Teloleuca bifasciata* (Thomson), *Teloleuca pellucens* (Fabricius) and *Saldula c-album* (Fieber) — are recorded as new to the fauna of the Americas. *Acanthia bellatrix* Bueno is suppressed as conspecific with *Teloleuca bifasciata,* and *Chartoscrita (Chartolampra) cursitans* Bueno is synonymized with *T. pellucens.* Information on other synonymies and new combinations are listed under the various species concerned. The left paramere of a number of species has been figured.

CHILOXANTHUS STELLATUS (Curtis)

Acanthia stellata Curtis, in Ross' 2nd Voy., App., 1835, p. 75.
Salda borealis Stal, Ofv. Vet. Ak. Forh., 9:391. 1868. (new synonymy)
Salda latifrons J. Sahlberg, K. Vet. Ak. Forh., 16(4):148. 1878.

A comparison of *C. stellatus* (Curtis) from Alaska and Northern Canada with specimens of *C. borealis* (Stal) from northern Europe and Siberia show that these two names apply to the same species, and that the latter must be placed in synonymy. Specimens of *C. stellatus* from Arctic America were sent to Dr. R. J. Izzard, British Museum, who concurs in this new synonymy. A left paramere of a specimen from Alaska is figured.

CALACANTHIA TRYBOMI (Sahlberg)

Salda trybomi J. Sahlberg, K. Vet. Ak. Handl., 16(4):35, 158. 1878.
Calacanthia trybomi VanDuzee, Canad. Arc. Exp., 1913-18, 3(F):4F. 1919.

The occurrence of the genus and species was first reported in the Americas by VanDuzee. The typical form and var. *apicola* have been listed for Alaska and Canada.

MICRACANTHIA QUADRIMACULATA (Champion)

Salda quadrimaculata Champion, Biol. Centr.-Amer., Rhynch., 2:399, pl. 20, fig. 8, 1900.
Micracanthia pusilla VanDuzee, San Diego Soc. Nat. Hist., 11:32. 1914.
Micracanthia pusilla VanDuzee, Cat. Hemip. Amer. N. Mex., 1917,p. 447.
Micracanthia pusilla Hungerford, Sci. Bull. Univ. Kan., 11:75. 1919.

This species, described as *Salda 4-maculata* Champ., from specimens collected in Panama, belongs to the genus *Micracanthia* Reuter. As *Micracanthia pusilla* VanDuzee from California is inseparable from *quadrimaculata*, it is here placed in synonymy. We are indebted to Dr. R. J. Izzard for comparing specimens of *pusilla* (including a paratype) with the types of *4-maculata* in the British Museum. Specimens have been examined from Mexico, United States (Calif., Ore., Wash., Ut., Ida., Colo., Nev., and Fla.) and Canada (Brit. Col.). The long-winged forms are larger than brachypterous individuals.

TELOLEUCA BIFASCIATA (Thompson)

Acanthia bellatrix Bueno, Can Ent., 56:298. 1924. (new synonymy)
Salda bifasciata Thompson, Op. Ent., 4:404. 187 1.
Salda riparia Zetterstedt, Fauna Lapp., p. 478. 1828.
Salda serior J. Sahlberg, K. Vet. Ak. Handl., 16(4):35, 1050. 1878.

This is the first record of the Genus *Teloleuca* Reuter in the Americas. The members of the genus seem to be primarily northern and are found in mountainous regions. The American specimens were taken along small streams in deep, narrow ravines in the mountains. Both *T. bifasciata* and *T. pellucens* inhabit similar types of ecologic habitats.

A comparison of a paratype and other specimens of *Acanthia bellatrix* Bueno from Canada and United States with specimens of *T. bifasciata* Thoms. shows these two names to apply to the same species, the latter having priority by many years. Specimens of *bifasciata* have been studied from Canada (Jasper, Aug. 15, 1896, and Waterton, Alberta, Aug. 30, 1924, H. L. Seamans; Lac. Nominque, Labelle Co., Que., D. Davenport) and United States (Georgetown, Colo., Aug. 27, 1909, W. J. Gerhard; Glacier National Park, Mont., Aug. 25, 1923, R. F. Hussey). One specimen was also recently examined from Dawson, Yukon, Can., June 23, 1916. It also occurs in Siberia. The color of the legs and hemelytral markings vary considerably in specimens from the same locality. The males are usually much smaller than the females. *T. bifasciata* may be readily separated from *pellucens* by the subbasal, marginal, yellowish spot on each side of the pronotum. A left paramere of a male from Colorado is figured.

TELOLEUCA PELLUCENS (Fabricius)

Acanthia pellucens Fabricius, Reise Norwegan, 1779, p. 234.
Salda riparia Fallen, Suppl. Mon. Cim., 2:1. 1826.
Salda affins Zetterstedt, Ins. Lapp., p. 267, 1840.
Salda luteipes Merrich-Schaeffer, Wanz. Ins., 6:40, fig. 597. 1841.
Salda conspicua Douglas and Scott, Ent. Monthl. Mag., 4:93, pl. 1, fig. 5.

Chartoscrita (Chartolampra) cursitans Bueno, Bull. Brookl. Ent. Soc. 18:151. 1923. (New Synonymy)
Acanthia celeripedis Bueno, Can. Ent., 56:296. 1924. (New synonymy)

This species is native of Northern Europe and Siberia; it is new to the fauna of North America. Specimens are at hand from Canada (Alberta and Ontario) and United States (Colorado, New York and Montana). They were taken in the same habitat and at the same time as *T. bifasciata*. The pronotum of *pellucens* is uniformly colored and without yellowish marginal spots. The females are also much larger than the males. On account of the variation in color of legs and hemelytral markings, both *pellucens* and *bifasciata* have been described several times as new.

Bueno, 1923, erected the subgenus *Chartolampra* of the genus *Chartoscrita* for his species *cursitnas*. This makes his subgenus a synonym of *Teloleuca* as *cursitans* is identical with *T. pellucens*. A year

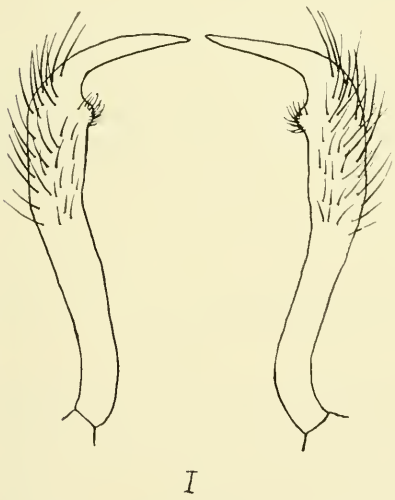

Fig. 1. Right and left parameres *Saldula fernaldi* Drake.

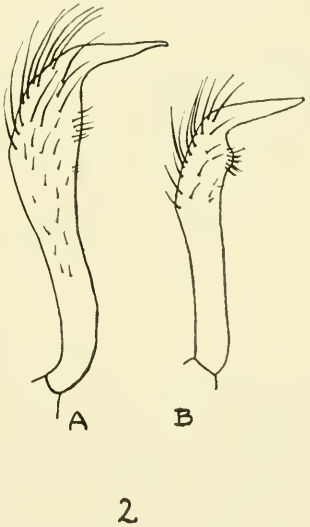

Fig. 2. A. Right paramere *Saldula sulcicollis* Champ. B. Right paramere *Saldula varionis* n. sp.

later, Bueno also described *Acanthia celeripedes*, which must also be suppressed as a synonym of *T. pellucens*. A left paramere of a specimen of *pellucens* from Glacial National Park, Montana, is figured.

SALDA BOUCHERVILLEI (Provancher)

Scrodopterus bouchervillei Provancher, Nat. Can., 4:106. 1872.
Salda coriacea Uhler, Hayden's Surv. Terr., Rep. for 1871, p. 421. 1872.

This is the commonest and most widely disseminated member of the genus *Salda* in the Americas. It ranges from Alaska (Rampart, July, 1915, J. A. Kuschee) clear across Canada and northern United States and then south into Arizona and Tennessee. It is quite variable in size and degree of wing development. Small specimens, especially brachypterous individuals, are often found in collections labaled *Salda obscura* Provancher. VanDuzee, Cat. Hemip. Amer. N. Mex., treated *obscura* as a synonym of *Salda littoralis* Linnaeus. It will be necessary to study the type of *S. obscura* Prov. before its status can be definitely settled. The type is in Provancher's collection, Quebec, Canada.

S. bouchervillei may be easily separated from *S. buenoi* and *S. littoralis* by its deep black shining color and extremely sparse pubescence. The pubescence is very short, golden, almost erect, very thinly scattered and scarcely noticeable. In the short-winged form the membrane is abbreviated and more or less coriaceous, sometimes even as coriaceous as the corium. The callus of the pronotum varies greatly in the degree of swelling or convexity. As a rule short-winged specimens have a larger callus than individuals with fully developed hemelytra. *S. bouchervillei* is very similar in size, color, vesture and general appearance to *S. morio* Zetterstedt of Europe. The latter tends to have a larger pronotal callus.

SALDA ANTHRACINA Uhler

Salda anthracina Uhler, Bull. U. S. Geol. Surv., III, p. 438. 1878.

Separated from *S. bouchervillei* Provancher by its narrower, strongly convex and campanulate pronotum and very strongly arched or convex hemelytra with sides decurved over upper edge of the abdomen. The dorsal surface is deep black, shining and very sparsely clothed with thinly scattered, short pubescence. The convexity of the dorsal surface of pronotum and hemelytra is peculiar to *anthracina*. Specimens have been examined from New Hamp., N. Y., Penna.

SALDA BUENOI (McDunnough)

Acanthia buenoi McDunnough, Can. Ent., 57:257. 1925.

This species has been generally confused in collections and publications with *Salda littoralis* (Linn.), *Saldula lugubris* (Say) and occa-

sionally with *Salda bouchervillei* (Provancher) and *S. anthracina* Uhler. It is easily separated from the latter two species by its dull black color and grayish-brown pubescence. The first cell of the membrane of *buenoi* projects forward as in the genus *Salda* Fabr., and thus does not form at the base a gradient series with the other cells as in *Saldula lugubris*. *S. littoralis* (Linn.) is densely clothed with distinctly longer, semi-reclining, yellowish-brown pubescence, which almost conceals the dorsal surface of the body. In *bueoni*, the pubsecence is much shorter, somewhat matted down basally and does not hide the dorsal surface. The species of the genus *Salda* of the Americas are quite distinct and easily separated from one another by the density, length, color, character of the pubescence and shape of the pronotum.

S. bueoni is fairly common in northern United States and Canada, and aparently it is much more frequently collected than *littoralis*. It ranges clear across Canada and northern United States. Specimens have been examined from Canada (Br. Col., Sask., Alta. and Ont.) and United States (Wash., Calif., Mont., Nev., Ore., Ida., Ut., Colo., Neb., N. Dak., S. Dak., Ia., Ill., Mich., Wisc., Mass. and N. Hamp). It is often taken on wet ground in thin vegetation near ponds, lakes and streams. As the short-winged form is not capable of flight, sparse vegetation affords some protection from its enemies. Both long- and short-winged forms are commonly found in the same habitats.

SALDA LITTORALIS (Linnaeus)

Cimex littoralis Linnaeus, Syst. Nat. Ed. X, 1758, p. 442.
Acanthia pellucens Fabricius, Reise Norw., 1779, p. 234.
Salda zosterae Burmeister, Handlb., 2:216. 1835.
Salda flavipes Fieber, Wien. Ent. Mon. III, p. 238, 15, 1859.

This European and Siberian species is widely distributed in Canada and United States. As pointed out above, it may be separated from its congeners by the dense, long, pubescence and its very neat appearance. Specimens have been examined from Colo., Mont., Ida., N. Dak., Utah and Maine. It undoubtedly occurs in most northern states, but published records of United States and Canada probably refer largely to *S. buenoi*, or to both species confused in the same paper.

SALDULA LUGUBRIS (Say)

Acanthia lugubris Say, Het. N. Harm., 1832, p. 34.
Salda major Provancher, Nat. Can., 1872, p. 107. (New synonymy)
Salda lugubris Uhler, Bull. U. S. Geol. Surv. 1:442, 1876.
Salda deplanta Uhler, Bull. U. S. Geol. Geog Surv., 3: 442. 1876.

As the descriptions of *S. major* (Uhler) and *S. lugubris* (Say)

refer to the same species, the latter name must supercede because of priority. Specimens of *lugubris* have been examined from Mo., Kan., Ill., Ia., Ind., Wisc., Minn., Mich., Ohio., N. J., Mass., R. I., N. Y., N. H., Me., Md., Penna., N. Dak., S. Dak., Mont., Colo., Ut., Tex., N. Mex., and Wyo. Specimens have also been studied from Ont., Sask., Que., and Br. Col., Canada. The right paramere of a specimen from Mitchell, Neb., is figured. The general color is dull blackish with or without brownish or yellowish spots on the hemelytra. In some specimens the pale hemelytral spots are quite prominent. The pubescence is rather dense, moderately long and dark golden in color. The first cell of the membrane forms a gradient series with the other cells and does not project anteriorly as in the genus *Salda*. Both long- and short-winged specimens are common.

SALDULA FERNALDI Drake

Salda fernaldi Drake, Psyche, 56(4):191. 1949.

In addition to the type series from Flower's Cove, Newfoundland, many specimens have been examined from Alaska (Valdez, low tidal flat at low tide, July 15, 1947, F. R. DuChanois; Anchorage, June, 1947, J. C. Chamberlain), Canada (Coal Harbor, Vancouver Is., Brit. Col., Sept. 1921, W. Downes) and United States (Chanook, Wash., Sept. 16, 1936; Taft, Ore., Feb. 1935, E. S. Ross; Waldorf Post, Ore., June 3, 1923; E. P. VanDuzee; Santa Cruz, Calif., June 3, 1919, E. P. VanDuzee; Pitsburg, Calif., No., 1922, E. P. VanDuzee; Marion Co., Calif., July 13, 1919, W. M. Gifford).

This species is distinguished from *pallipes* Fabr. by its larger size and the longer, denser, golden pubescence on the hemelytra. In good specimens, the pubescence on the side margins of the pronotum is also quite conspicuous. The pronotum and scutellum are moderately shining. As *fernaldi* frequents low, muddy, tidal flats, specimens are at times smeared with mud as netted or picked up by hand. Removing the mud and cleaning the specimens as they are mounted often denudes them of pubescence.

SALDULA SULCICOLIS (Champion)

Salda sulcicolis Champion, Biol. Centr.-Amer., Rhynch., 2:340, pl. fig. 1900.

A left paramere of a male from Vara Blanca, Costa Rica, is figured. The type series were taken in Panama, Guatemale and Mexico.

SALDULA COXALIS (Stal)

Salda coxalis Stal, Svensk. Vet.-Ak. Handl., 11(2):140. 1873.
Salda argentina Berg, Hemip. Ar., 1879, p. 293. (New synonymy)
Saldula argentina Drake, Bull. Brookl. Ent., 45(1):3. 1950.

The type of *S. coxalis* Stal is a pinned, female specimen in Naturhistoriska Rikemuseum, Stockholm. The pin bears four separate labels as follows: "Cuba," "Stal," "*coxalis* Stal," and "162." The third label from the top "*coxalis* Stal" is in Stal's own handwriting. A comparison of the types of *coxalis* and *argentina* Berg (La Plata Mus.) show that these species are conspecific and not separate entities. As *coxalis* is the older by several years, it becomes the valid name of the species.

In size and general appearance, *S. coxalis* is quite similar to *S. pallipes*, but it may be readily separated by the pale stripes on the outer margins of the pronotum. These stripes, as a rule, terminate a little before reaching the front and hind pronotal margins.

SALDULA **VARIONIS** Drake and Hottes, sp. new

Small, ovate, brownish-black, with or without narrow marginal stripes on sides of pronotum, sometimes with small or large yellowish spots in front of humeral angles, the hemelytra largely pale brownish, the pubescence short, brownish or golden, rather dense, recumbent. Head black, with a few long bristly hairs in front, with a small rounded pale spot between each ocellus and eye; frons broad, light brown; the transverse apical ridges whitish, strongly swollen, separated by a brownish line concave above, becoming narrower ventrally. Clypeus yellowish-brown, tumid, rectangular in form, with a small yellowish callus on each side near the middle. Genae and bucculae black, with long silvery white pile; labrum brownish. Antennae brownish black, shortly pilose, the last two segments with scattered long bristly hair; segment I stoutest, yellowish brown, with large elongate black spot; II becoming brown apically; III and IV brownish black; proportions—I, 10; II, 20; III, 13; IV, 14. Rostrum ferrugineous black, shining, reaching between the coxae. Body beneath blackish, with long grayish pile.

Pronotum black, deeply excavated behind; stripe along lateral margin as seen from above narrow, brown to testaceous, sometimes barely visible or wanting, beneath much broader, always visible and yellowish brown; humeral angles within often with a small to large brownish spot or patch; lateral margins narrowed anteriorly, slightly reflexed, distinctly rounded. Callus moderately convex, not extending

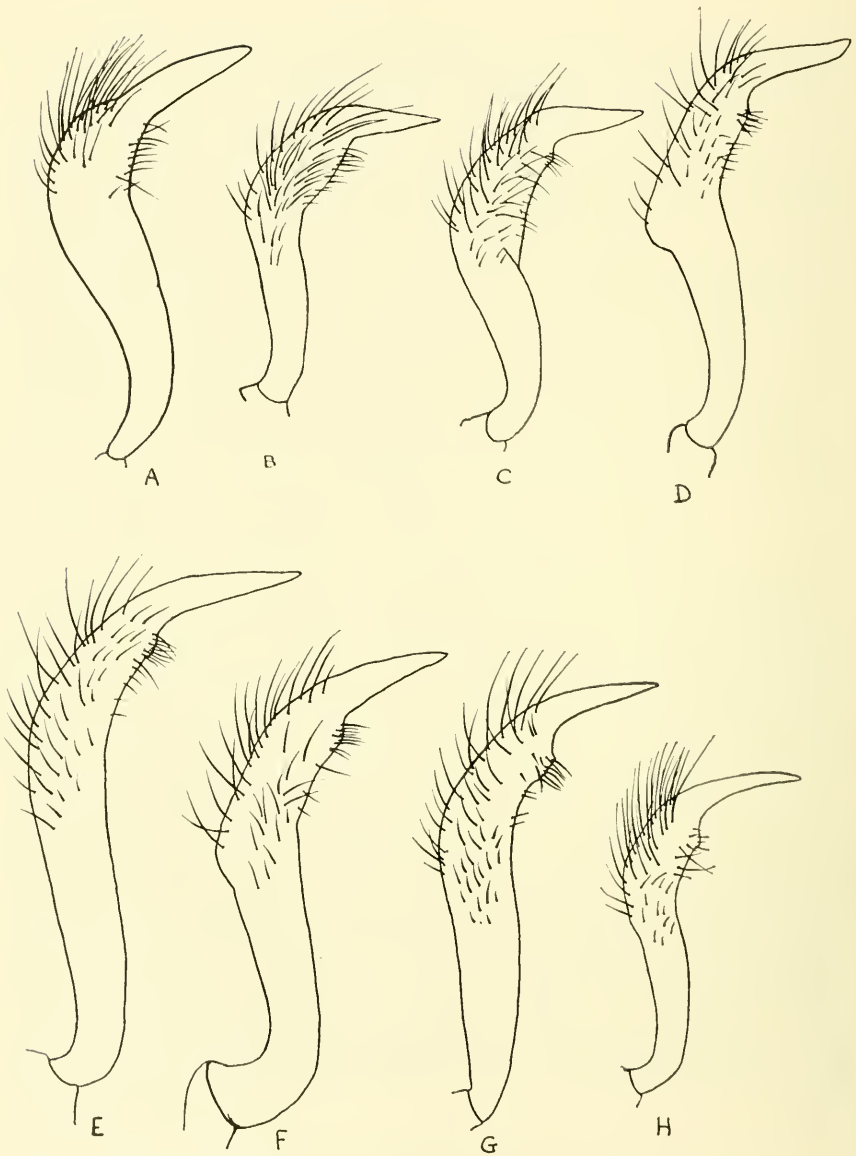

Fig. 3. A. Right paramere *Chiloxanthus stellatus* Curtis.
B. Right paramere *Teloleuca bifasciata* (Thoms.).
C. Right paramere *Teloleuca pellucens* F.
D. Right paramere *Saldula lugubris* (Say).
E. Right paramere *Salda bouchervillei* (Provancher).
F. Right paramere *Salda buenoi* (McDunnough).
G. Right paramere *Salda littoralis* (L.).
H. Right paramere *Saldula illinoiensis* Drake.

on explanate margins, with large deep impressions on the disc; transverse furrow behind callus arcuate, moderately deep, pitted at bottom; hind lobe about one-half as long as callus. Scutellum nearly as wide as long, with discal impression just in front of middle, pubescence as on pronotum. Hemelytra largely brownish, with small blackish and yellowish white areas; clavus with large whitish apical spot, generally blackish, but sometimes largely brown, pubescence about as on scutellum; corium somewhat variable in color, largely brownish, with small basal area and one to three marginal blackish spots; median area with some pale and darker brown areas; membrane yellowish or yellowish white, with four cells, each cell with a long brownish streak beyond middle. Legs yellowish brown; femora with small brown spots beneath largely black and the pale hairs longer. Presternal plates of fore coxae largely white.

Length, 3.55 mm.; width, 1.30 mm.

Type (male), *allotype* (female) and paratypes, Gateway, Colorado, Sept.-Oct., 1949, C. J. Drake and F. C. Hottes; 2 paratypes, Skyway, Colo., Oct., 1949, F. C. Hottes. Several paratypes, Escalante Desert, Kane Co., Utah, Aug., 1949, D. E. Beck, Grand Junction, Colo., Apr.-May, 1950, many specimens, F. C. Hottes. Type in collection of C. J. Drake; paratypes in collection of both authors, also Brigham Young University and Museum Comparative Zoology, Harvard University.

This species is most closely allied to *S. balli* Drake, but it is a little larger and with pronotal markings and color of hemelytra. The pronotum is quite variable in color; sometimes the pronotal stripes are not visible from above, but they are always present on the underside. The spot in front of each humeral angle may be small, large or entirely absent. The pronotal stripes are not visible on the dorsal surface in the type, allotype and some of the paratypes. At the present time, it seems better to treat *S. varionis* as a species rather than as a variety of *S. balli* Drake. *S. coxalis* (Stal) and *S. xanthochila limbosa* Horvath are much larger species.

SALDULA C-ALBUM (Fieber)

Salda c-album Fieber, Wine. Ent. Mon., 3:256, sp. 10. 1859.

This European species has heretofore not been reported as occurring in the Americas. In collections and literature, it is confounded with *S. pallipes* (Fabr.). It may be separated from *saltatoria* by the large c-shaped, marginal spot just in front of the middle of each heme-

lytron and shape of pronotum. The anterior tibiae have the long basal stripe interrupted as in *saltatoria*. The basal tibial stripe is long and solid in *pallipes*. Specimens of *c-album* have been examined from Alaska, Canada (Ontario and British Columbia) and United States (Washington, D. C.; Golden, N. Y., E. P. VanDuzee; Cranberry Lake, N. Y., 1918, C. J. Drake; Ames, Iowa, March 23, 1928, G. S. Walley; Barrien Co., Michigan, 1918; Fort Collins, Colo., 1898, E. D. Ball; Logan, Utah, July 10, 1923, T. O. Thacher; Sidney, Ill., June 20, 1898, E. L. McElfresh; Santa Cruz Mts., Calif., Koeble.

SALDULA ANDREI Drake

Saldula andrei Drake, Ark. Cor. Zool 42B(3). 1949.
Salda laviniae Hodgden, Jr. Kan. Ent. Soc., 22(4):158, figs. 11 & 12. 1949.
Saldula andrei Drake and Hottes, Proc. Biol. Soc. Wash., 62:177, figs. 11. 1949.

An examination of a paratype of *Salda laviniae* Hodgsen shows that this name must be suppressed as the species is conspecific with *Saldula andrei* Drake. Specimens have been examined from Texas, Ariz., N. Mex., Calif., Ariz., Nev., Ore., Wash., Ida., Wyo., Utah and Colo. It was also taken by the writers at Cranbrook, Br. Col., Canada, Aug., 1949.

S. andrei is primarily saxicolis, and is commonest in very stony situations where the shores of streams are almost completely covered with stones several inches in diameter. It is found resting as individuals on the sides of stones not far from the water's edge. Small streams, flowing on beds of solid rock with rocky shores are also lightly populated. Occasionally, it may be taken sparingly on wet, sandy-gravelly beaches of streams.

SALDULA ILLINOIENSIS Drake

Saldula illinoiensis Drake, Ark. Cor. Zool., 42B(3):2. 1949.

This moderately, shaggy species was described from three specimens labeled "Ill"., in the Naturhistoriska Ritsmuseum, Stockholm. Since then, specimens have been received from Ill. (Urbana, July 9, E. L. McElfresh), Mich. (Marine Is., July 23, 1923, T. H. Hubbell), Colo. (Georgetown, July 27, 1909, W. J. Gerhard; Happy Hollow, July 7, 1898, E. D. Ball; Pingree Park, Aug. 17, 1924, C. J. Drake), New York (Cranberry Lake, Aug. 22, 1923, C. J. Drake), Mich. (Marion Is., Grand Traverse Co., July 25, 1923, T. H. Hubbell), Wis., (Madison, July 14, 1918, E. D. Ball), Neb. (Sioux Co., 1918, Myron T. Swenk), Hamp., Minn. and Mass.

This species is often taken in both short- and long-winged forms in the same habitat. In brachypterous individuals, the membrane of the hemelytra is greatly abbreviated and extend very little beyond the tip of the abdomen. It is one of the few species of *Saldula*, which has seta-like hairs growing out of its compound eyes. The color and markings of the hemelytra are very similar to *S. orthochila* (Fieber) of Europe, but it is easily separated from it by the dorsal vesture of moderately dense, erect, dark hairs and hairy eyes.

NEW DISTRIBUTIONAL RECORDS FOR UTAH SIPHONAPTERA

VERNON J. TIPTON [1]

Although Chapin's (1919) description of *Ceratophyllus utahensis* (= *C. garei* Rothschild 1902) collected by Alexander Wetmore in 1916 was the first indication of flea work in Utah, Stanford (1931) published the first distributional list of fleas for Utah. A later publication by Stanford (1943) listed twenty-seven genera and forty-six species and subspecies of fleas known to occur within the state. A public health survey conducted by Prince (1943) revealed the presence of two species of two different genera which heretofore were unknown in the state. Hubbard, in his monographic work, "Fleas of Western North America" (1946), lists the above records. Hubbard also records three species, representing two genera, collected by himself, which are new distributional records for the state.

The writer collected extensively in Utah County in central Utah during the summer of 1948 and the winter of 1948-1949 and in southern Utah during the spring and summer of 1949. The following list of new distributional records of fleas in Utah brings the total known species and subspecies to fifty-eight, representing thirty-six genera. Also included in this paper are records of fleas previously known from the state. Unless otherwise indicated, records listed are those of the writer.

NEW DISTRIBUTIONAL RECORDS

1. *Amphalius necopinus* (Jordan 1925) 2 ♂♂
   Host: *Ochotona princeps*
   Cedar Breaks, Utah
   6 August 1949
2. *Dactylopsylla rara* I. Fox 1940 ♀ ♂
   Host: *Thomomys sp.*
   Cedar Breaks, Utah
   6 August 1949
3. *Malareus euphorbi* (Rothschild 1905) 3 ♀ 1 ♂
   Host: *Peromyscus maniculatus sonoriensis*
   Lehi, Utah
   30 October 1948

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1 Notes from a thesis submitted to the Department of Zoology and Entomology, Brigham Young University, as partial requirement for a Master of Science degree, June, 1949, Contribution No. 119.

4. *Megarthroglossus procus* Jordan and Rothschild 1915 5 ♀ 6 ♂
   Host: *Neotoma cinerea* (nest)
   Provo, Utah
   30 October 1948
5. *Opisodasys pseudarctomys* (Baker 1904) 5♀ 2 ♂
   Host: *Glaucomys sabrinus lucifugus*
   Aspen Grove (Mt. Timpanogos), Utah
   15 August 1948
6. *Rectofrontia fraterna* (Baker 1895) 8 ♀ 2 ♂
   Host: *Neotoma cinerea* (nest)
   Provo, Utah
   6 November 1948
7. *Sternopsylla texana* (C. Fox 1914) 2 ♀
   Host: *Myotis californicus*
   Delta, Utah
   7 July 1949
   Coll. D. M. Allred and D. E. Beck

ADDITIONAL RECORDS OF FLEAS PREVIOUSLY COLLECTED IN UTAH

1. *Anomiopsyllus amphibolus* Wagner 1936
   Hosts: *Neotoma cinerea, N. lepida*
2. *Atyphloceras* sp. (probably *multidentatus*)
   Host: *Neotoma cinerea*
3. *Catallagia decepiens* Rothschild 1915
   Hosts: *Eutamias quadrivittatus umbrinus, Sylvilagus nuttalli*
4. *Cediopsylla inaequalis inaequalis* (Baker 1895)
   Hosts: *Sylvilagus nuttalli, Lepus californicus*
5. *Ctenophyllus terribilis* (Rothschild 1903)
   Host: *Ochotona princeps*
6. *Diamanus montanus* (Baker 1895)
   Hosts: *Neotoma cinerea, Citellus variegatus*
7. *Epitedia stanfordi* Traub 1944
   Hosts: *Peromyscus maniculatus, P. truei, Onochomys leucogaster, Sylvilagus nuttalli*
8. *Epitedia wenmanni* (Rothschild 1904)
   Hosts: *Mus musculus, Peromyscus maniculatus, Microtus montanus*
9. *Foxella ignota* subsp.
   Hosts: *Clethrionomys gapperi galei, Thomomys bottae, Thomomys talpoides*

10. *Foxella ignota utahensis* Wagner 1936
    Host: *Thomomys* sp.
11. *Hoplopsyllus anomalus* (Baker 1904)
    Host: *Citellus variegatus*
12. *Hystrichopsylla gigas dippiei* (Rothschild 1902)
    Hosts: *Neotoma cinerea, Peromyscus maniculatus, Microtus montanus, Zapus princeps, Tamiasciurus hudsonicus ventorum*
13. *Malaraeus bitterrootensis* (Dunn 1923)
    Host: *Citellus lateralis*
14. *Malareus sinomus* (Jordan 1925)
    Hosts: *Peromyscus truei, P. maniculatus, Perognathus parvus, Neotoma* sp., *Peromyscus crinitus*
15. *Malareus telchinum* (Rothschild 1905)
    Hosts: *Peromyscus truei, P. maniculans, Microtus montanus*
16. *Megabothris abantis* (Rothschild 1905)
    Hosts: *Peromyscus maniculatus, Microtus longicaudas, Clethrionomys gapperi galei*
17. *Megarthroglossus divisus divisus* (Baker 1895)
    Host: *Tamiasciurus fremonti*
18. *Meringis parkeri* Jordan 1937
    Hosts: *Peromyscus maniculatus, Onochomys leucogaster, Dipodomys ordii, Dipodomys microps*
19. *Micropsylla sectilis* (Jordan and Rothschild 1923)
    Host: *Peromyscus maniculatus*
20. *Monopsyllus ciliatus kincaidi* Hubbard 1946
    Host: *Eutamias quadrivittatus umbrinus*
21. *Monopsyllus exilis exilis* (Jordan 1937)
    Host: *Onochomys* sp.
22. *Monopsyllus wagneri wagneri* (Baker 1904)
    Hosts: *Peromyscus maniculatus, Clethrionomys gapperi galei, Neotoma lepida, Onochomys leucogaster, Mus musculus, Rattus norvegicus, Bubo virginianus*
23. *Myodopsylla gentilis* Jordan and Rothschild 1921
    Host: *Myotis californicus*
24. *Odontopsyllus dentatus* (Baker 1904)
    Host: *Sylvilagus nuttalli*
25. *Opisodasys keeni* (Baker 1896)
    Hosts: *Peromyscus maniculatus, P. truei, Mus musculus*
26. *Orchopeas caedens caedens* (Jordan 1925)
    Host: *Tamiasciurus fremonti*

27. *Orchopeas leucopus* (Baker 1904)
Hosts: *Peromyscus maniculatus, Reithrodontomys megalotis, Onochomys* sp.
28. *Orchopeas sexdentatus agilis* (Rothschild 1905)
Hosts: *Neotoma cinerea, N. lepida, Peromyscus maniculatus*
29. *Oropsylla idahoensis* (Baker 1904)
Hosts: *Peromyscus maniculatus, Citellus armatus*
30. *Peromyscopsylla selenis* (Rothschild 1906)
Host: *Microtus longicaudus*
31. *Phalacropsylla allos* Wagner 1936
Host: *Neotoma cinerea*
32. *Stenistomera alpina* (Baker 1895)
Host: *Neotoma cinerea*
33. *Thrassis gladiolis caducus* (Jordan 1930)
Hosts: *Citellus leucurus, Dipodomys ordii, Onochomys* sp.
34. *Thrassis howelli utahensis* Wagner 1936
Host: *Marmota flaviventris* ssp.
35. *Thrassis stanfordi* Wagner 1936
Host: *Marmota flaviventris nosophora*

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THE STAPHYLINOID AND DASCILLOID AQUATIC COLEOPTERA OF THE NEVADA AREA

IRA LA RIVERS
University of Nevada, Reno

Included in the following list, in addition to actual records, are what are considered to be the most likely probables (genera and species) to be added to the list with future collecting. These are placed in the text and keys in the belief that such information will render their detection easier.

STAPHYLINOIDEA

HYDRAENIDAE (Limnebiidae)

The three genera currently placed in this family may be separated by Leech's 1948 key. He also gives a good review of the vicissitudes of the group, until comparatively recently included in the Hydrophilidae. On the basis of larval structure, they have been placed in the Staphylinoidea.

ADULTS

1. Second segment of hind tarsi elongate, longer than third; pronotum behind as broad as base of elytra, smooth, not coarsely punctate or sculptured, sides evenly arcuate; tiny black or rufescent beetles about 1 mm long.....(Limnebius)

——Second segment of metatarsi short, about as long as third; pronotum slightly or decidedly narrower than base of elytra, surface uneven, coarsely punctate or with a transparent margin, sides sinuate or irregular; small black or reddish beetles, 1 to 2 mm long.....2

——Surface more-or-less alutaceous.....2

2. Elytral base slightly narrower than prothorax; surface strongly alutaceous.....(*alutaceous* (Casey) 1886)

——Elytral base equal in width to porthorax; surface only feebly alutaceous.....(*congener* (Casey) 1886)

Fall (1901) felt that Casey's *L. politus* 1886, *L. alutaceus* and *L. congener*, all described from California, were merely forms of the variable species *L. piceus*, but the above key is offered to specifically enumerate the types of variation.

(HYDRAENA Kugelann 1894)

H. vandykei d'Orchymont is known from adjacent California.

OCHTHEBIUS Leach 1815

The following species must be considered for the general area (Horn 1890, Fall 1901, Usinger et al 1948):

1. Elytral sides explanate.....(*martini* Fall 1919)

——Elytral sides not explanate.....2

2. Thorax abruptly sinuately-narrowing from apex to base; transparent border broad 3

——Thorax gradually sinuately-narrowing from apex to base; transparent border narrow 10

3. Thorax abruptly sinuately-narrowing from one-third or less posterior to the apical angle, and with a pronounced angulation at middle of sinuation.....(*laevipennis* Le Conte 1878)

——Thorax abruptly sinuate from middle, or deeply-notched near the hind angles 4

4. Thorax without discal foveae.....*cribricollis* Le Conte 1850

——Thorax with well-marked discal foveae.....5

5. Transparent thoracic border narrowly attaining the front angles....6

——Border ending (or beginning) at lateral thoracic sinuation.....8

6. Thoracic discal foveae on each side united by an impressed line..... .....*costipennis* Fall 1901

——Foveae not united.....7

7. Thoracic sides behind front angles straight....*rectus* Le Conte 1878

——Sides arcuate from apex to middle, there they are slightly sinuate and abruptly, deeply, emarginate, the angle prominent and acute..... .....*wickhami* Fall 1901

8. Thoracic discal foveae united by a deep groove; disc coarsely-punctured.....*puncticollis* Le Conte 1852

——Foveae separate 9

9. Thoracic disc sparsely punctate.....*discretus* Le Conte 1878

——Disc impunctate.....*nitidus* Le Conte 1850

10. Median thoracic line extremely short or wanting.....11

——Line distinct, extending two-thirds the length of the thorax.....12

11. Thoracic discal impressions forming a continuous line; lateral foveae broad and moderately deep.....*sculptus* Le Conte 1878

——Discal impressions very vague, posterior pair only distinct, these forming broad, shallow depressions which are indefinitely-confluent posteriorly; lateral foveae formed of indistinct sinuous depressions .....*holmbergi* Mannerheim 1853

12. Thoracic discal foveae forming fine sinuate lines, disc rather flat; transparent border very narrow, beginning at middle..... .....*lineatus* Le Conte 1851

——Foveae of usual form, but at times shallow.....13

13. Thoracic discal and lateral impressions both strongly-marked..*bruesi*

——Discal foveae deep, lateral foveae shallow.....*interruptus*

O. BRUESI Darlington 1928. Eureka County, 7 mi. S. of Beowawe, C. T. Brues, 1927—Hot Spring No. 24 (38.8°C, sp. gr. 1.0020, pH 9.6), (Brues 1928, 1932; Darlington 1928); Humboldt County, Soldier Meadows (35 mi. N. of Gerlach in SW Humboldt County, and not on maps), C. T. Brues, 1930—Hot Spring No. 113 (19.2°C, sp. gr. 1.0007, pH 8.8)); Lander County, Cortez, C. T. Brues, 1930—Hot Spring No. 103 (40.8°C, sp. gr. 1.0041, pH 8.5)) (Brues 1932). Beowawe is the type locality. I have no specimens.

O. INTERRUPTUS Le Conte 1852. Elko County, 4 mi. N. of Wells, C. T. Brues, 1927—Hot Spring No. 26 (32.5°C, sp. gr. 1.0018, pH 7.9)) (Brues 1927, 1932); Lander County (Cortez, C. T. Brues, 1930—Hot Spring No. 103 (44.5°C, sp. gr. 1.0041, pH 8.5)) (Brues 1932). I have no specimens.

(SPHAERIIDAE)

(SPHAERIUS Waltl 1838)

S. politus Horn 1868 is a tiny, round, convex, shining beetle, measuring one mm or less, found along the water's edge or under wet stones. It was described from California. In 1901, Fall noted that it "is rather common on the sandy margins of streams, and is often started in numbers by 'washing' the banks" in southern California.

HYDROSCAPHIDAE

HYDROSCAPHA Le Conte 1874

H. NATANS Le Conte 1874. Nye County, Beatty (Amargosa River) 29/XII/46, el. 3390 ft.—LaR, T. J. Trelease, B. H. Banta & R. G. Miller. This is the first record of this tiny, distinctive species in southern Nevada; the animal is common to the area south of Nevada. A quite populous colony was located in the icy Amargosa river just south of Beatty in moderately swift, rough water which froze at the banks each night. Individuals were found clinging lethargically to the undersurface of rhyolite stones well-grown with thin algal layers. Associated species were *Tropisternus ellipticus, Dineutes striatellus, Peltodytes simplex, Berosus punctatissimus, Laccophilus decipiens, Helochares normalis, Enochrus diffusus, E. nebulous* and *Laccobius agilis. H. natans* was noted by Le Conte (1874) as "Found abundantly by Mr. Crotch, at Los Angeles in the river."

DASCILLOIDEA

(GEORYSSIDAE)

(GEORYSSUS Latreille 1809)

G. californicus Le Conte 1874 is a small species taken along the banks of mountain streams . Fall (1901) listed the species as "taken once along the Truckee River, near Lake Tahoe; probably common enough in the middle and northern parts of the State" (California), and may very likely yet be found in the mountains in the south." Individuals are characteristically covered with mud, which effectively serves to conceal them.

(HELODIDAE)

(HELODES Latreille 1796)

Helodes adults, like those of *Eubrianax*, are frequenters of streamside foliage, but the larvae are more-or-less aquatic; some species enter water only occasionally, others live more-or-less regularly in water accumulated in tree hollows. Larval respiration underwater is accomplished through abdominal spiracles operating in a terminal bubble of air.

Three species have been described from adjacent California; *H. apicalis* Le Conte 1866, *H. nunenmacheri* Wolcott 1922 and *H. aquatica* Blaisdell 1940. At the present time, it is not possible to offer a key to separate them. Blaisdell wrote of *H. aquatica*: "A colony was discovered on the under surface of a rather large flat rock, that projected out of and over the surface of the water, at an angle of few degrees, in a rather swiftly flowing stream. When the rock was lifted up the beetles were disturbed, most of them falling upon the water. As soon as they struck the water, they began to swim briskly and to gyrate as do the Gyrinids; they dove beneath the surface and swam rapidly under the surface, all endeavoring to return to the rock" (1940). The species was described from coastal California.

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STUDIES IN THE WEEVILS OF THE WESTERN UNITED STATES, NO. VII: DESCRIPTION OF A NEW GENUS [1]

VASCO M. TANNER
Professor of Zoology and Entomology
Brigham Young University

PSEUDOEUCYLLUS Tanner, nov. gen.

Rostrum as long as the head, robust, much narrowed in front, elytra not divergent, tip not emarginate. Scrobes lateral, deep, slightly arcuate, passing backwards and attaining the eyes, antennae scaly, scape arcuate and reaching just to the posterior margin of the eye; funicle 7-jointed, longer than the scape; segments 1-2 long, the first longer than the second, 3-7 globular and about equal in length; club large and oval. Thorax cylindrical, as broad as long. Scutellum invisible. Elytra oblong oval. Intercoxal process broad, truncate, second segment longer than the two following, separated from the first by an arcuate suture. Tibiae with closed corbels, cotyloid surface of hind ones squamose. Claws long, not connate. Body scaly with sparse, fine, moderately long hairs.

This genus should be placed between Horn's *Dysticheus* and *Eucyllus*. The rostral length and shape, length of antennae segments, ventral segments and body covering are distinctive generic characters which separate these genera.

GENOTYPE: *Pseudoeucyllus boulderensis,* new species.

PSEUDOEUCYLLUS BOULDERENSIS Tanner, n. sp.

Elongate oval, densely squamose and with fine moderately long hairs which arise along the central portions of the elytral intervals; head and rostrum as long as the thorax, rostrum with a broad transverse impression at the base, densely covered with an intermixture of whitish and brownish overlapping scales and whitish hairs, and with a longitudinal furrow which extends from just above the origin of the scrobes to the transverse impression; scales on the vertex brownish. Scrobes lateral, deep and arcuate, open at the anterior and broadly passing back to the eyes; scape origin about in the middle of the scrobes, slender arcuate and extending to the posterior margin of the ovate eyes. First segment of the funicle as long as the second and

(1) Contribution No 124, Dept. of Zoology and Entomology.

third segments combined; first and second segments as long as the 3 to 7 segments combined. Club large, as long as the first segment and brownish in color, antennae slightly scaly and setiferous, thorax as long as broad, truncate at apex and base, sides moderately arcuate, disc slightly convex, sparsely punctured and densely covered with dark

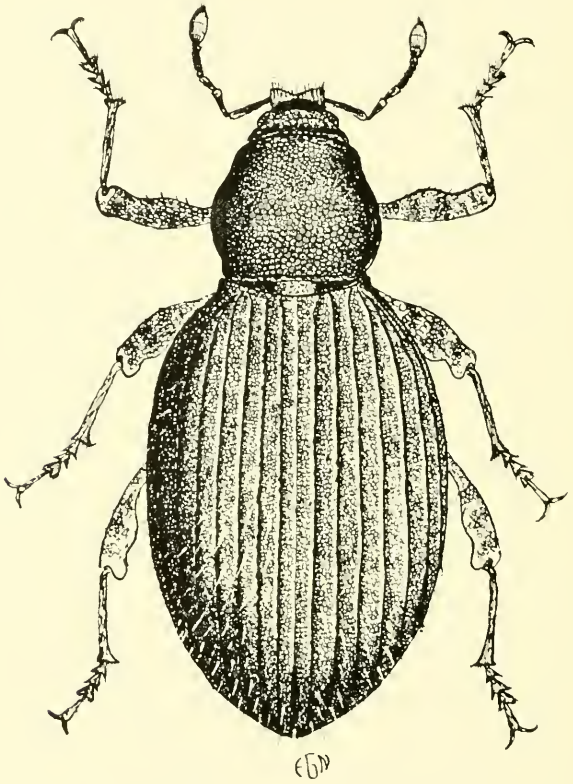

Fig. 1. Dorsal view of *Pseudocucyllus boulderensis*, n. sp. 5x.

brown scales and very fine hairs. Elytra elongate oval, not twice as long as wide, humerus truncate, striae fine, straight and evenly spaced from the suture to the margin; intervals smooth with fine hairs along the middle; striae with widely separated punctures. Body beneath densely scaly, hairs sparse and short; legs uniformly covered with dark brown scales and whitish hairs; femora strongly constricted near the distal ends; tips of tibiae fringed with amber colored short spines, cotyloid surface squamose. Claws longer than the second tarsal segment, widely

divergent and not connate. Second ventral segment wider than the first, and the third and fourth combined. Length 5.5 mm.

The hispid body hairs of *Eucyllus vagans* differ from *boulderensis* which are fine, slightly recumbent and more hairlike. The broad transverse impression at the base of the rostrum, the long first and second funicle segments, narrow third and fourth ventrals and long nonconnate claws serve to distinguish this interesting new species. Figure I is a drawing of this new species.

HOLOTYPE: a perfect unique.

TYPE LOCALITY: Boulder City, Clark County, Nevada. Collected May 1, 1941 by Vasco M. Tanner. Type No. 63 in the author's collection at Brigham Young University.

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